

Improvisational Theater for Psychological Health

by

Peter Felsman

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Doctoral Committee:

Professor Joseph A. Himle, Co-Chair
Professor Colleen M. Seifert, Co-Chair
Professor Ethan Kross
Professor Richard Tolman

Peter George Felsman
pfelsman@umich.edu
ORCID iD: 0000-0002-8481-8592

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Dedication

To my mother, Lynne Smilow, for leading me to laugh; to my brother, Henry Felsman, for inviting me to play; and to my late father, Jonathan Felsman, for teaching me to wonder.

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Abstract

Mental health interventions are severely underutilized for a number of reasons, including high costs and social stigma. An alternative non-stigmatizing method to address many trans-diagnostic psychotherapeutic goals (e.g., psychological flexibility in Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Bermant, 2013) is modern American improvisational theater, which has its roots in the 1920s as a tool for facilitating personal and social development (Steitzer, 2011). It has been suggested that improvisation training may reduce anxiety (Krueger, Murphy, & Bink, 2017; Phillips Sheesley, Pfeffer, & Barish, 2016); however, no prior study has examined the relationship between improvisation training and social anxiety. Further, no study has explored whether improvisation promotes tolerance for uncertainty, which has been linked to reduced anxiety and shown to explain variance in social anxiety (Boelen, & Reijntjes, 2009). Further, positive effects on mood have been identified in both improvisation and social interaction treatments (Lewis & Lovatt, 2013). This dissertation aims to empirically test whether improvising might benefit psychological health and explore reasons why.

Chapter 2 evaluates an existing improvisational theater training program created by The Detroit Creativity Project called *The Improv Project*, which teaches life skills through improvisational theater to middle and high schoolers in Detroit public schools. Specifically, we find that participating in an improv course predicts reductions in social anxiety. Further, social anxiety does not appear to be a barrier to participation in the project. However, as a field study of an existing program, this method lacks a randomly assigned control condition.

Chapter 3 follows an experimental paradigm from previous research linking improvisation training to improvements in divergent thinking in the laboratory (Lewis & Lovatt, 2013). We examine whether a short exposure to improvisational theater training can increase tolerance of uncertainty, shown to predict reductions in social anxiety during cognitive behavior therapy (Mahoney & McEvoy, 2012). We find across two experiments that a brief session of improvising causes improvements in uncertainty tolerance and divergent thinking, as well as affective well-being, compared to a social interaction control. Further, these relative gains appear to depend on which specific features of the improv condition differ from the social interaction control condition. As an experiment with random assignment to condition, this work offers desirable features for internal validity, but lacks generalizability (Cook, Campbell, & Shadish, 2002).

Chapter 4 tests the relationship established in Chapter 3 between improv and uncertainty tolerance back in the field setting. Specifically, we find that participating in an improvisational theater program for adolescents (described in Chapter 2) predicts increases in uncertainty tolerance, and replicate the Chapter 2 analysis linking improvisational theater training program with reductions in social anxiety symptoms. Additionally, we find that the increase in uncertainty tolerance in this study also predicts reductions in social anxiety.

Taken together, this research provides the first empirical evidence that improvisational theater training benefits those with social anxiety problems, and that this is likely in part because engaging in improvisational theater exercises causes increased tolerance of uncertainty.

Chapter 1: Introduction

Traditional Mental Health Treatment Access Gaps and the Need for Something Different

The best-documented evidence-based practice for treating anxiety disorders is cognitive-behavioral therapy (CBT). CBT includes cognitive restructuring and exposure to social situations (Schneier, Bruce, & Heimberg, 2014), typically delivered in a variety of formats (e.g., for individuals or groups), settings (e.g., outpatient clinics, inpatient services, community clinics, schools) and durations (9-20 sessions) (James, James, Cowdrey, Soler, & Choke, 2015).

The exposure component of CBT consists of graduated exercises targeting individual concerns (e.g., public speaking), and helping people encounter previously avoided experiences or testing potential cognitive errors. The underlying mechanism of effectiveness may include learned habituation, initial fear activation followed by fear reduction, or inhibitory learning, emphasizing the development of new, non-threat associations that become more accessible across time and context (Craske et al., 2008). The cognitive restructuring component of CBT involves re-evaluating biased thinking by considering additional relevant information (or acknowledging the absence of information). While studies have questioned the added benefit of restructuring over exposure alone, there is evidence that both methods effectively reduce symptoms (Hawley, Rector, & Lapsa, 2016).

CBT is thus a well-established treatment for phobias and anxiety disorders (e.g. Norton & Price, 2007). However, it can be difficult to access, especially for those with social anxiety. In addition to under-recognition of social anxiety among adolescents (Coles et al., 2016), individual barriers to standard treatment include logistical inconvenience, financial costs, making informed

decisions about services, social stigma, fear of medication, lack of motivation, and even symptoms of psychological disorders (Harvey & Gumport, 2015) such as behavioral avoidance in social anxiety (Olfson et al., 2000; Yuen et al., 2013). Such issues of access are evidenced by low mental health service utilization rates among adolescents with mental health issues broadly (35%) (Costello, He, Sampson, Kessler, & Merikangas, 2014).

Over the past three decades, one movement that has been promising for increasing accessibility of mental health treatment is transdiagnostic therapy, which has emerged partly in response to 1) the impracticality of clinicians working with multiple disorder-specific manuals, as well as 2) high rates of comorbidity, similarities between disorders, and broad treatment effects (Craske, 2012). Of these therapies, the “third wave”¹ behavior therapies² (Hayes, 2004) or “contextual behavioral therapies” (Hayes, Villate, Levin, Hildebrandt, 2011) have garnered considerable empirical attention, although their empirical support does not meet the rigor of CBT (Hofmann, Sawyer, & Fang, 2010). Although the emphasis on building broad and flexible repertoires over syndrome-specific protocols (Hayes et al., 2011) is compelling for increasing accessibility, these treatments suffer many of the same access barriers as traditional CBT: namely, they are expensive and stigmatizing.

Due to the barriers to accessing standard CBT and emerging evidence-based treatments, alternative treatments that are easier to access and less stigmatizing are needed.

Improvisational theater as a context for treating anxiety

¹ There has been resistance in clinical psychology to the idea of a “new wave” of therapies that is worth noting, in which a good number of well-respected researchers advocate for abandoning the term altogether (Hofmann, Sawyer, & Fang, 2010). Nevertheless, as this paper is principally interested in innovations to CBT, I present the theory that highlights novelty, rather than lumping all extensions of CBT into the “family of interventions” that Hofmann et al. consider CBT proper.

² Following Hayes (2004), I use “behavioral therapies” as an inclusive term meant to refer to both behavioral and cognitive therapies.

One form of programming with great promise for addressing promoting psychological health is improvisational theater training. Improvisation stresses the co-occurrence of process and product (Sowden, Clements, Redlich, & Lewis, 2015), including “performing without any preparation or planning” (Halpern, Close, & Johnson, 1994). It is a highly interactive social activity that rewards the development of skills such as attentive listening, acceptance, nonverbal communication, interpersonal trust, and peer support (Berk & Trieber, 2009).

Although improvisational theater training has become a popular training method for talk and sketch show actors and writers (e.g., on Saturday Night Live), it arose from a social intervention designed to help immigrant children with personal development and social skills (Spolin, 1983). In recent years, improvisational theater has gained attention in clinical science as an activity that overlaps substantially with applied therapies that promote well-being, such as mindfulness, positive psychology interventions, and person-centered psychotherapy (Bermant, 2013). Practitioners suggest that improvisation is, “...not just good for performance, it’s good for life” (e.g., Madson, 2005).

The number one goal of an improviser is “to be of most use to one’s scene partner”, meaning that each improviser should be “identifying things [they] can do to help the moment, the scene, the show...behaving attentively, with [their] last thought being about [themselves]” (Jagodowski, Pasquesi, & Victor, 2015), succeeding to the extent that they are supporting one another’s performance (e.g., Fotis, 2014). Across traditions of improvisation, there is a strong emphasis on *group* process as a superordinate goal (Jagodowski et al., 2015; Johnstone, 1999; Spolin, 1983). Understanding that each group member is supporting one another builds trust, and helps group members feel safer while taking risks. Classes combine active learning (or “playing”) and reflection, and these two components can also serve as a means of behavioral

exposure and cognitive restructuring. A key feature of improvisation is that what happens from moment to moment is intentionally uncertain (Besser, Roberts, Walsh, & Wengert, 2013), such that “Honest discovery, observation, and reaction is better than contrived invention” (Halpern et al., 1994). Improvisational theater has the potential to specifically reduce levels of social anxiety because it offers exposure to social interaction experiences in the face of intentional uncertainty. This could also be expected to boost uncertainty tolerance, a trans-diagnostic target of more formal psychological interventions (Boelen, & Reijntjes, 2009).

Improvisational theater has been used to promote psychological health benefits since at least Jacob Moreno’s development of psychodrama in the 1920s, involving the dramatization of personal experience using techniques such as role play and role reversal (Kedem-Tahar & Felix-Kellermann, 1996). In the 1960s, drama therapy developed out of psychodrama, embracing enactments with greater psychological distance than traditional psychodrama (Emunah, 1994), borrowing exercises from both improvisational theater (e.g., from Viola Spolin), and non-improvisational exercises such as designing masks (Kedem-Tahar & Felix-Kellermann, 1996). There is a wealth of research about both drama therapy and psychodrama as intervention tools for social development (for review, see Fernández-Aguayo, & Pino-Juste, 2018). While evidence of their effectiveness is increasing (Dunphy, Mullane, & Jacobsson, 2013), there have been calls for more rigor in research and clarity in intervention practice (Butler & Gaines, 2016; Dokter & Winn, 2010). In addition, studying theater outside a context that is explicitly “therapy” may be “therapeutic” (Butler, 2017).

More specifically, improvisational theater training to promote mental health has received strong theoretical support (Phillips Sheesley et al., 2016; Steitzer, 2011; Wiener, 1994). However, empirical research to document its usefulness is again limited. One recent study

showed that *Thera-prov*, a program of four, two-hour sessions of improv plus homework targeting psychological outcomes, facilitated by a licensed clinical psychologist, reduced anxiety and depression and boosted self-esteem in a sample of 32 adult psychiatric patients (Krueger, Murphy, & Bink, 2017). However, no studies have examined whether improvisational theater training is linked to reduced social anxiety in a naturalistic setting such as a school. Further, no study has examined whether engaging in improvisational theater promotes uncertainty tolerance, which improvisation is likely to do seeing as it is by definition repeated (and often pleasant) exposure to uncertainty.

This dissertation tests whether improvisational theater training predicts decreases in social anxiety and increases in uncertainty tolerance, important empirical contributions to an emerging scientific focus on improvisational theater and mental health. Specifically, in Chapter 2, we test whether improvisational theater training as it occurs in the community predicts gains in psychological health, beginning with social anxiety. For the first field study, we evaluate an existing improvisational theater training program, The Detroit Creativity Project's *The Improv Project*, which teaches life skills through improvisational theater to middle and high schoolers in Detroit public schools, and test whether participating in the course predicts reductions in social anxiety among teenagers.

In Chapter 3, we follow an experimental paradigm linking improv training to improvements in divergent thinking (Lewis & Lovatt, 2013), and examine whether a short experience of improvisational theater can cause an increase in uncertainty tolerance, shown to predict reductions in social anxiety (Mahoney & McEvoy, 2012). In two laboratory experiments, we test whether improvisational theater predicts gains in uncertainty tolerance and divergent

thinking, and explore how these gains appear to depend on the features of improv highlighted by the social interaction control comparison.

Finally, in Chapter 4, we test the finding from Chapter 3 that improv promotes uncertainty tolerance in a more ecologically valid intervention in the field. Specifically, we test whether participating in the improvisational theater program described in Chapter 2 predicts increases in uncertainty tolerance, replicate the finding that participating in the improvisational theater training program predicts reductions in social anxiety symptoms, and then test whether changes in uncertainty tolerance predict changes in social anxiety.

Chapter 2: Improvisational Theater Training to Reduce Social Anxiety in Adolescents

Social anxiety and the need for alternative treatments

Social phobia (also Social Anxiety Disorder – SAD), describes an individual who is “fearful or anxious about or avoidant of social interactions and situations that involve the possibility of being scrutinized” (American Psychiatric Association, 2013), and is among the most common functionally impairing psychological conditions in adolescents (Costello et al., 2014; Bandelow & Michaelis, 2015).

In adolescence, peer-related socializing becomes increasingly important (Crockett, Losoff, & Petersen, 1984), and pressure to secure social status mounts (Corsaro & Eder, 1990; Li & Wright, 2014); consequently, teens are particularly vulnerable to experiencing social phobia (Albano, 1996; Knappe, Sasagawa, & Creswell, 2015). Indeed, onset for social phobia is most often during adolescence (Kessler, Chiu, Demler, & Walters, 2005; Bandelow & Michaelis, 2015; Knappe et al., 2015), often persisting into adulthood (Schneier et al., 2014).

Compared with a healthy population, those who meet criteria for social phobia are likely to have higher levels of drug dependency, drug problems, and unemployment, lower levels of socioeconomic class, household income, quality of life, and educational achievement (Patel, Knapp, Henderson & Baldwin, 2002; Asher, Asnaani, & Aderka, 2017). In addition to the evidence suggesting SAD is comorbid with a variety of mental and physical disorders, there is evidence that it is a causal risk factor for depression, substance abuse and even psychosis (Knappe et al., 2015).

The best-documented evidence-based practice for treating social phobia is cognitive-behavioral therapy (CBT). CBT includes cognitive restructuring and exposure to social situations (Schneier et al., 2014), typically delivered in a variety of formats (e.g., for individuals or groups), settings (e.g., outpatient clinics, inpatient services, community clinics, schools) and durations (9-20 sessions) (James et al., 2015).

The exposure component of CBT for SAD consists of graduated exercises targeting SAD concerns (e.g., public speaking and performance), and helping people encounter previously avoided experiences. The underlying mechanism of effectiveness may include learned habituation, initial fear activation followed by fear reduction, or inhibitory learning, emphasizing the development of new, non-threat associations that become more accessible across time and context (Craske et al., 2008). The cognitive restructuring component of CBT for SAD involves re-evaluating biased interpretations of social situations by considering additional relevant information (or acknowledging the absence of information). While studies have questioned the added benefit of restructuring over exposure alone, there is evidence that both methods effectively reduce symptoms (Hawley, et al., 2016).

CBT is thus a well-established treatment for phobias and anxiety disorders (e.g. Norton & Price, 2007). However, it can be difficult to access, especially for those with social anxiety. In addition to under-recognition of social anxiety among adolescents (Coles et al., 2016), individual barriers to standard treatment include logistical inconvenience, financial costs, making informed decisions about services, social stigma, fear of medication, and a lack of motivation or other symptoms arising from the nature of phobia and anxiety disorders (Harvey & Gumport, 2015), such as behavioral avoidance in social phobia (Olfson et al., 2000; Yuen et al., 2013). Such issues of access are evidenced by low mental health service utilization rates among adolescents

with mental health issues broadly (35%), and by even lower service utilization rates among persons with social anxiety (25%) compared to most other disorders (Costello et al., 2014).

Due to the barriers to accessing standard CBT, alternative treatments that are easier to access and less stigmatizing are needed. For several reasons, a school-based intervention that includes students with and without social anxiety may be helpful in promoting psychological health and reducing social phobia:

1) Group therapy may be as effective as individual therapy for social anxiety disorder (Powers, Sigmarsson, & Emmelkamp, 2008), and provides a relatively cost-effective and readily accessible exposure context.

2) A major goal of standard therapy – to help patients transfer practices from therapy into their daily lives (Beck, 1979, p. 5) – is facilitated by intervening within a naturalistic setting (e.g., school-based class).

3) Requiring no selection criteria eliminates the possibility of stigma becoming associated with participation.

4) Including group members with varying levels of social functioning allows participants to act as models, a valuable feature in an intervention context that promotes intra-group cooperation and mutual support.

Improvisational theater as a context for treating anxiety

One form of programming with great promise for addressing social anxiety is improvisational theater training. Improvisation stresses the co-occurrence of process and product (Sowden et al., 2015), including “performing without any preparation or planning” (Halpern et al., 1994). It is a highly interactive social activity that rewards the development of skills such as

attentive listening, acceptance, nonverbal communication, interpersonal trust, and peer support (Berk & Trieber, 2009).

Although improvisational theater training has become a popular training method for talk and sketch show actors and writers (e.g., Saturday Night Live), its historical roots lay in a social intervention designed to help immigrant children with personal development and social skills (Spolin, 1983). In recent years, improvisational theater has gained attention in clinical science as an activity that overlaps substantially with applied therapies that promote well-being, such as mindfulness, positive psychology interventions, and person-centered psychotherapy (Bermant, 2013). Practitioners suggest that improvisation is, "...not just good for performance, it's good for life" (e.g., Madson, 2005).

The number one goal of an improviser is "to be of most use to one's scene partner," meaning that each improviser should be "identifying things [they] can do to help the moment, the scene, the show...behaving attentively, with [their] last thought being about [themselves]" (Jagodowski et al., 2015), succeeding to the extent that they are supporting one another's performance (e.g., Fotis, 2014). Across traditions of improvisation, there is a strong emphasis on *group* process as a superordinate goal (Jagodowski et al., 2015; Johnstone, 1999; Spolin, 1983). Understanding that each group member is supporting one another builds trust and helps group members feel safer taking risks. Classes oscillate between active learning (or "playing") and reflection, and these two components can serve as non-stigmatizing behavioral exposure and cognitive restructuring. A key feature of improvisation is that what happens moment to moment is intentionally uncertain (Besser et al., 2013), such that "Honest discovery, observation, and reaction is better than contrived invention" (Halpern et al., 1994). While improvisational theater has been used for promoting psychological health broadly, its potential to reduce levels of social

anxiety is likely because it offers exposure to social performance experiences in the face of intentional uncertainty.

Improvisational theater has been used to promote psychological health benefits since at least Jacob Moreno's development of psychodrama in the 1920s, involving the dramatization of personal experience using techniques such as role play and role reversal (Kedem-Tahar & Felix-Kellermann, 1996). In the 1960s, drama therapy developed out of psychodrama, embracing enactments with greater psychological distance than traditional psychodrama (Emunah, 1994), borrowing exercises from improvisational theater (e.g., from Viola Spolin), as well as non-improvisational exercises such as designing masks (Kedem-Tahar & Felix-Kellermann, 1996). There is a wealth of research on both drama therapy and psychodrama as intervention tools for social development (for review, see Fernández-Aguayo, & Pino-Juste, 2018). While evidence of their effectiveness is emergent (Dunphy et al., 2013), there have been calls for more rigor in research and clarity in intervention practice (Butler & Gaines, 2016; Dokter & Winn, 2010). In addition, studying theater outside a context that is explicitly "therapy" may be "therapeutic" (Butler, 2017).

More specifically, improvisational theater training to promote mental health has received strong theoretical support (Phillips Sheesley et al., 2016; Steitzer, 2011; Wiener, 1994). However, empirical research to document its usefulness is limited. One recent study showed that *Thera-prov*, a program of four, two-hour sessions of improv plus homework targeting psychological outcomes, facilitated by a licensed clinical psychologist, reduced anxiety and depression and boosted self-esteem in a sample of 32 adult psychiatric patients (Krueger, Murphy, & Bink, 2017). However, no studies have examined whether improvisational theater training is linked to reduced social anxiety in a naturalistic setting such as a school.

The Improv Project.

The Improv Project is a school-based intervention that teaches social skills and exposes students to social performance. Through a 10-week improvisational theater (also referred to as “improv”) course at no cost to participating schools, the mission of the program is to empower young people to build confidence and develop a creative and collaborative approach to their lives. It was designed by alumni of Second City Detroit with input from classroom teachers and *The Improv Project* instructors.

The instructors are recruited and trained through the arts division at the YMCA of Metropolitan Detroit. The team of instructors meet each term for additional training and program refinement. They also share similar improvisational theater training backgrounds, drawing largely on the work of Viola Spolin and the tradition of Second City. To ensure consistency between sites, instructors use a standardized syllabus scheduling work on the same skills across classes. Weeks 1-8 include both improvisation and life skills (e.g., self-awareness, empathy, and respect for others), as described in the syllabus (excerpted in Appendix A).

Week one of the program focuses on building confidence and trust in the ensemble, using exercises such as “Zip Zap Zop”, in which students stand in a circle and pass the focus around using eye contact, a clap and point gesture, and a verbal cue). Week two focuses on accepting and building on each other’s ideas with the “golden rule” “Yes, and” (Berk & Trieber, 2009), using exercises such as “One Word At a Time Story”, in which students work as a group to tell a story as if it were written by a single author. Week three focuses on committing to an improvised environment, using exercises such as “Space Walk”, in which students are guided through a series of suggestions about what their environment might be (e.g., a warm beach, a snowy field). Week four focuses on emotional choices, using exercises such as “Emotional Options”, a scenic

game (2-3 student participants) in which the instructor periodically pauses the scene and asks the audience for a suggestion for how a character feels about something before continuing the scene. Week five focuses on character and status, using exercises such as “Hitchhiker”, in which two students are seated as if they are driving a car and periodically pick up a passenger, a student from offstage who enters with a clear character choice that then everyone in the car matches - when the driver finds a reason to exit, the students shift, a new driver takes over and the exercise continues with the next offstage student making a clear character choice. Week six focuses on justification, using exercises such as “Pillars”, in which students in a scene will periodically turn to a student offstage to complete dialogue for them, usually a word or so at a time, and then continue the scene as if that dialogue were unsurprising. Week seven focuses on storytelling, using exercises such as “Conducted Story”, in which students in a line on stage continue telling a story from a single perspective when they are pointed to by the instructor. Week eight focuses on recapping popular games. Weeks nine and 10 focus on continuing to review and preparing a show, which students may elect to participate in outside of school hours at the end of the term.

Middle and high schools in the Detroit area that participate in *The Improv Project* meet the following requirements: 1) they are willing to promote the project to their students, 2) they can offer a dedicated space for the class, 3) their class size will be 8-15 students per instructor (if a class size is greater than 15 students, a second improv instructor is added), 4) consistent student participation is scheduled week to week, 5) a classroom teacher acts as a point of contact at the school. Special preference is given to middle and high schools with 1) an interest in expanding limited arts programming, 2) a representative who is committed to the program, 3) a majority of students are considered economically disadvantaged by federal measures or eligible for

free/reduced price meals and 4) low performance on the reading/writing sections of state and national tests.

Based on available demographic information on school websites, students at the schools included in *The Improv Project* were mostly ethnic minorities (primarily Hispanic or Latino, Black or African American) who qualified for free or reduced lunch meal programs. From the 256 students who reported their gender, 43% were male (57% female).

Study overview

The current study examines the impact of a school-based 10-week multi-site improvisational theater course (*The Improv Project*) for groups of middle and high school students in a large Midwestern city, with a single group, pre/post design. Specifically, this study investigates whether adolescents participating in an improvisational class who screen positive for social anxiety at the beginning of class experience reduced symptoms of social anxiety at post-test. Additionally, pre/post measures of confidence in social behavior and other relevant correlates are collected. We expected that reductions in social anxiety would correlate with 1) increases in self-reported social skills because people who believe they lack social skills are more anxious about self-presentational concerns in social situations (Leary & Jongman-Sereno, 2014); 2) decreases in symptoms of depression because it is highly comorbid with social anxiety and even anxiety-specific treatments have been shown to reduce depression (Craske, 2012); 3) increases in hope and creative self-efficacy because one of the hallmarks of social anxiety is brooding, defined by negative and unproductive perseveration (Brozovich et al., 2015) and associated with poor problem-solving (e.g., Burwell & Shirk, 2007). Finally, we test whether the improv program impacts all participants (including those who did not screen positive for social phobia).

Method

Participants

Across 10 schools, 266 students completed pre-test surveys on the first day of class, and 147 students completed posttest surveys on the last day of class (See Table 2.1) during a single fall term. Students' grade level ranged from 8th through 12th. All students provided written consent to participate in this research. The Human Subjects Review Board at the University of Michigan determined this project to be exempt and not regulated based on Exemption #1 of the 45 CFR 46.101 (b): "Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods."

Procedure

The instructors or program staff collected paper and pencil measures during weeks 1 and 10 of the program. The pre/post surveys were matched using unique identifiers to keep each student's responses anonymous. Each time, students were told that the questionnaire would be used to help evaluate the course, to answer honestly, and that the survey should take about 15 minutes.

Materials

The pre- and post-course survey was designed in collaboration with the improvisation training instructors, as well as board members of The Detroit Creativity Project. The pre-test instrument included five established psychological measures, including a widely-used measure of social anxiety, five additional questions to gauge response to the class, a question asking about experience with improvisation (pre-test only), and an item to capture grade level. The pre-course

item asking about previous experience was replaced with an item to capture usefulness of training outside of class post-course. Finally, the post-course measurement included an additional 6 items from previous program evaluation materials and a single-item engagement measure.

Social skills

To measure of social skills, we used an 8-item shortened version of the Adolescent Social Self-Efficacy Scale (Connolly, 1989). The items on this measure describe commonly occurring social events that may be challenging for teens. Its construct validity was previously demonstrated by positive correlations with relevant constructs such as perceived social acceptance, self-esteem, social engagement, social competence; among psychiatric samples, it correlates with higher staff ratings of social adjustment and lower levels of withdrawal (Connolly, 1989). Pilot data of the 25-item version revealed good internal consistency (an alpha of greater than .90); a single-factor solution for all items; and, good test-retest reliability, $r(85) = 0.84, p < 0.001$. The 8 items loading highest onto the single factor solution were used to create the shortened scale. This version consisted of original items such as, “Start a conversation with a boy or girl you don’t know very well,” and “Attend an event where you are sure you won’t know any of the kids.” Participants rated how difficult it would be for them to do each of the actions on a 7-point scale, from 1 (*Extremely Easy*) to 7 (*Impossible*). Items were reverse-scored and averaged for each student, with a higher score indicating greater self-confidence in their social skills. Cronbach’s alphas for this 8-item measure at pre and post were .880 and .864, respectively, revealing adequate internal consistency (Tavakol, & Dennick, 2011).

Social anxiety

The 3-item Generalized Social Anxiety Disorder measure, the MINI-SPIN, is a widely used measure of social anxiety (Connor, Kobak, Churchill, Katzelnick, & Davidson, 2001). Participants rated “how true” each item was about themselves (e.g., “Fear of embarrassment causes me to avoid doing things or speaking to people.”) on a 5-point scale from 0 (*Not at all*) to 4 (*Extremely*). Scores were summed for each student, with higher scores indicating a higher level of social anxiety. In our use of the measure as a screener, we used the recommended cutoff of 6, which has been shown to have good sensitivity and specificity for detecting social phobia in adults (Connor et al., 2001) as well as adolescents (Ranta, Kaltiala-Heino, Rantanen, & Marttunen, 2012). Cronbach’s alphas for this 3-item measure at pre and post were .780 and .708, respectively, revealing adequate internal consistency (Tavakol, & Dennick, 2011).

Depression

The Patient Health Questionnaire-2 (PHQ-2) measured depression (Richardson et al., 2010). Participants were instructed to rate how frequently they’d been bothered by 1) lack of interest or pleasure in doing things, and 2) feeling down, depressed, or hopeless, on a 4-point scale (*Not at all [0], Several Days [1], More than one-half the days [2], or Nearly every day [3]*). Here, scores were summed for each student, with higher scores indicating higher levels of depression. Cronbach’s alphas for this 2-item measure at pre and post were .455 and .580, respectively, revealing inadequate internal consistency (Tavakol, & Dennick, 2011). We note that an alpha coefficient for a 2-item scale almost always underestimates true reliability, sometimes greatly (Eisinga, Te Grotenhuis, & Pelzer, 2013).

Hope

The 6-item Children’s Hope Scale was designed and validated within a sample of children ages 8-16, to capture confidence in one’s ability to figure out ways to achieve goals and

to initiate and sustain action towards those goals (Snyder et al., 1997). It has been shown to have acceptable internal consistency and test-retest reliability in adolescents, and convergent validity demonstrated by a positive correlation with parent judgments of children's hope, as well as self-reported perceived competency and self-worth, and a negative correlation with depression (Snyder et al., 1997). An average score was computed for each student, with higher scores indicating a greater sense of hope. Cronbach's alphas for this 6-item measure at pre and post were .764 and .848, respectively, revealing adequate internal consistency (Tavakol, & Dennick, 2011).

Creativity

The 3-item Creative Self-efficacy Scale has been shown to correlate with mastery- and performance-approach beliefs, holding positive beliefs about academic abilities, and teacher feedback on creative ability (Beghetto, 2006). It included items such as, "I am good at coming up with new ideas," and participants were asked to indicate their belief that each statement was true for them, from 1 (*Not True*) to 5 (*Very True*). Here, the average score was computed for each student, with high scores indicating greater creative self-efficacy. Cronbach's alphas for this 3-item measure at pre and post were .839 and .882, respectively.

Additional items

Five items such as, "I am comfortable performing for others," and "I am willing to make mistakes," were included based on *The Detroit Project's* program goals. Students rated their agreement with each item, from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). Six program evaluation items were added to the post-survey only, such as, "I know what 'Yes, and' means," and, "I would recommend this class to a friend." Students rated how true each item was for them, from 1 (*Not at all*) to 5 (*Extremely*). On the post-survey only, participants were also asked

whether they applied their improvisation training outside of class, and how to make the class better for future students.

Engagement

A single item measured program engagement (“I was fully engaged in this program when I was in class”), assessed at post-test only. Students were instructed to rate how true this item was for them, on a scale from 1 (*Not at all*) to 5 (*Extremely*). Pilot data indicated that students’ self-reported engagement correlates with classroom teacher-reported engagement on a 5-point scale, $r(108) = 0.425$, $p < 0.001$, offering some convergent validity for the self-report item. Of the 47 students who reported that they were “very much” or “extremely” engaged in the program, 98% (all but one) were rated by their teachers as at least “somewhat” engaged.

Results

Changes among participants screening positive for social phobia

To answer our research questions about the relationship between improvisational theater training and social anxiety, we used the Mini-SPIN to screen participants for social anxiety at week one of the program. For those who screened positive at week 1 (46.2% of the adolescents who completed surveys at weeks 1 and 10), we then fit a multilevel model to the Mini-SPIN change scores. The model included a fixed overall intercept, representing the mean overall change from Time 1 to Time 2, in addition to random school effects (to account for any within-school correlation in the change scores), and random errors associated with the individual change scores. The variance of the random school effects divided by the total variance (the variance of the random school effects plus the variance of the within-school errors) yields an estimate of the within-school correlation.

We found that the estimate of the fixed overall intercept was -2.41 ($SE = 0.51, p = 0.003$), suggesting a significant decrease in social anxiety scores over time (accounting for the random school effects). The estimated within-school correlation for these change scores was 0.04 .

Of the 67 who screened positive for social phobia at week 1 and were surveyed again at week 10, 29 no longer screened positive. Notably, the effect size of social anxiety reduction among this group is large, $d = 0.952$.

For convergent validity, we next computed correlations with other available change scores. Among the students who screened positive for social phobia at week 1, we found that change in social anxiety from week 1 to week 10 negatively correlated with changes in self-reported social skills, $r(67) = -0.592, p < .001$; hope, $r(66) = -0.343, p = 0.005$; creative self-efficacy, $r(65) = -.298, p = 0.016$; and agreement with the statements, “I am comfortable performing for others,” $r(66) = -0.509, p < 0.001$, and “I am willing to make mistakes,” $r(66) = -0.263, p = 0.033$. These findings show that reductions in social anxiety were related to increased confidence in social skills, ability to figure out how to achieve goals and take action to do so (hope), creative ability, increased comfort performing for others, and greater willingness to make mistakes. Change in social anxiety score was marginally correlated with change in PHQ-2 score, $r(67) = 0.229, p = 0.063$, and did not correlate significantly with change in agreement to the statements, “I feel accepted by my classmates,” or “I pay attention to how others are behaving.”

Attendance and social anxiety

Attendance at the first and last class periods was inconsistent, so that only 54.5% of the surveyed students enrolled in the program at week 1 completed surveys at week 10. To consider the potential self-selection bias, the pre/post sample ($n = 145$) was compared to students attending only in Week 1 ($n = 124$). The results show that students present for week 1 (and not

week 10) did not differ from students who completed both surveys, with one exception: The students who were present only for week 1 agreed less with the statement, “I am excited to take this class,” $t(243.70) = 2.53, p = 0.012$.

Changes in the overall sample

To test whether social anxiety was reduced among the full sample of students (i.e., whether benefits occur for all students), we repeated our main analysis with all available pre- and post- program survey data.

We found that the estimate of the fixed overall intercept in this case was -0.369 ($SE = 0.30, p = 0.225$), suggesting no change in the overall social anxiety scores over time (accounting for the random school effects).

At the end of the program, 69.4% of students agreed (at least somewhat) that improvisation training had been helpful to them outside of class ($n = 147$). In general, students felt they had learned about improvisation from the class, found the lessons to be valuable outside of class, and would recommend it (see Table 2.2). For all 7 post-survey items, at least 62.8% ($n = 147$) of students agreed “very much” or “extremely,” and over 87.6% agreed at least “somewhat” with all 7 statements regarding the program’s impact.

Engagement as a predictor

To examine the potential impact of engagement on overall outcomes, we correlated self-reported engagement with the nine measures we collected over time (See Table 2.3). We found that students’ engagement positively predicted self-reported increases in social skills, hope, creative self-efficacy, comfort performing for others, willingness to make mistakes, and outward social attention, as well as a decrease in symptoms of social anxiety.

Discussion

This study is the first to test the efficacy of a school-based improvisational theater program as a mental health intervention, and it offers positive results. Following the ten-week improvisation training program, students who initially screened positive for social phobia problems showed significant decreases in social anxiety in the final week. 43% of students who screened positive for social phobia at week 1 no longer screened positive in the final week of the program. This change was correlated with increases in social skills, hope, creative self-efficacy, comfort performing for others, willingness to make mistakes, and decreases in symptoms of depression. Though the program dropout rate was high, students surveyed only at week 1 did not differ in social anxiety scores from students completing the program; though often a barrier to standard treatments, we found no evidence that social anxiety problems were a barrier to participating in this program.

Nevertheless, it is worth noting here other barriers to participation. Chronic absenteeism is particularly problematic across Detroit public schools. Rates in the year preceding this study were at 58%, meaning that most students miss 10 or more days of school for any reason (Lenhoff, & Pogodzinski, 2018). Another explanation for the high dropout rate is that there were logistical issues getting week 10 surveys administered at some of our schools during class time due to end of the term field trips and assemblies. A scheduling conflict at one school, School H, meant that no week 10 surveys were collected there (see Table 2.1).

Including all students in the program, there was no observed change in social anxiety symptoms; however, a majority of students thought the course had been valuable to them (see Table 2.2): On the week 10 survey, most students endorsed the course as useful to them in other areas of life, and said they would take another class and recommend the class to a friend; They thought they had learned to value teamwork more, became more comfortable performing for

others, and finally, reported that they had learned the “golden rule” of improv, “Yes, And...” (Berk & Trieber, 2009). Students who expressed more engagement in the course also had greater increases in social skills, hope, and willingness to make mistakes (among other self-report measures), suggesting the program led to feelings of increased self-efficacy (see Table 2.3).

These findings are important because adolescents often fail to receive the mental health treatment they need, especially treatment for Social Anxiety Disorder (Costello et al., 2014), to which teens are particularly vulnerable (Albano, 1996; Kessler et al., 2005; Bandelow & Michaelis, 2015). Adolescents identify barriers to accessing mental health treatment including embarrassment, not wanting to talk about mental health problems, and not trusting clinicians (Chandra & Minkovitz, 2006; Lavik, Veseth, Frøysa, Binder, & Moltu, 2018). The school-based improvisation program evaluated in this study overcomes these barriers through 1) its setting within a school (without identifying those “in need of treatment”); 2) only indirectly targeting psychological health by using improvisational theater to reward behaviors known to reduce social anxiety; and 3) theater instructors rather than professional psychologists or counselors leading the course. Additionally, the program in the current study primarily engages students in low socioeconomic and minority groups, two demographic predictors of decreased use of mental health services (Zarger & Rich, 2016).

Limitations

Several limitations are evident in the study’s design. First, although the pre-post design does track changes over time, the study is by design correlational. A replication with an appropriate control group is needed to rule out confounds such as a placebo effect. Note that in this study, a placebo effect may be less likely to influence reported social anxiety symptoms than in traditional mental health intervention research because this program is offered as an arts

education effort. Finally, there was high attrition (45.5%) in our study. While we found evidence that social anxiety did not influence attrition, we were unable to test whether these attrition issues were unique to the program we evaluated or more general issues at the schools in which this program took place. In the future, it would be useful to compare attendance of program participants with students from their same schools or compare attrition with a control or comparison group. Finally, while it is a strength of this paper that the participants come from poorer, lower performing schools where barriers to accessing standard treatments for social anxiety are greater than in better resourced contexts, we acknowledge that there may be a selection bias here – that is, for adolescents at wealthier, higher performing schools with access to more traditional treatments, participating in improvisational theater training may predict different outcomes. Future research should examine this further.

Concluding comment

Given that there are many challenges to accessing standard psychological treatments (Harvey & Gumpert, 2015) and growing theoretical justification for using improvisational theater to promote psychological health (Phillips Sheesley et al., 2016; Wiener, 1994), this work offers an important early contribution to the empirical literature on improvisation and mental health, showing that for adolescents with social anxiety problems, participating in a school-based improvisational theater program may offer a low stigma, low cost, more accessible context for reducing those symptoms.

Table 2.1. Students surveyed by school and time.

School	Time of day	Week 1	Week 10	Pre & Post	Students Surveyed	Grade Levels
A	Afternoon	29	24	24	29	9-12
B	Morning	22	17	17	22	12
C	Rotating In-School Schedule	29	16	16	29	8 th only
D	Morning	19	3	3	19	9-12
E	After School	12	8	8	12	8-12
F	Afternoon	22	22	21	23	8-10
G	Morning	49	18	19	48	9-12
H	Afternoon	13	0	0	13	9-12
I	Morning	54	24	23	55	11-12
J	Afternoon	17	14	14	17	12
Total		266	147*	145	268	8-12

Note. *Total includes 1 student whose school was unspecified.

Table 2.2. End of class response frequencies.

Statement	Extent of agreement				
	Not at all	A little bit	Somewhat	Very much	Extremely
I know what “yes and” means.	1	9	25	40	71
This class helped me become more comfortable performing for others.	2	15	33	43	54
I learned to value teamwork in this class.	4	7	29	51	56
I would take another improv class.	7	11	36	27	64
I would recommend improv class to a friend.	6	10	25	39	61
I can use what I learned in improv in other parts of my life.	6	11	28	43	57
I was fully engaged in this program when I was in class.	2	6	36	47	56

Table 2.3. Engagement predicting change over time

Measure	<i>r</i>	<i>p</i>	<i>n</i>
Social Skills	.260**	.002	144
Mini-SPIN	-.189*	.023	144
PHQ-2	-.021	.803	143
Hope	.234*	.005	143
Creative Self-Efficacy	.250**	.003	142
Feeling Accepted	.130	.122	143
Comfort Performing	.277**	.001	143
Willingness to Make Mistakes	.240**	.004	143
Attention to Others	.249**	.003	142

Note. * = statistically significant at $p < .05$, ** = statistically significant at $p < .01$.

Chapter 3: Improv Experience Promotes Divergent Thinking, Uncertainty Tolerance, and Affective Well-Being

Since the 1960s, improvisational theater (*improv*) training has grown exponentially in popularity (Seham, 2001), and now nearly every major city in the United States has an improv theatre (Steitzer, 2011). Beyond celebrity actors and writers (e.g., Tina Fey; Fey, 2013) and business moguls (e.g., Dick Costolo, Twitter CEO; Bilton, 2012) who attribute their success in life to their improv training, many people believe that it has broad benefits for everyday living (Madson, 2005).

Improv is defined by unplanned collaborative performance (Halpern et al., 1994) where (?) process and product co-occur (Sowden et al., 2015). This can be contrasted with scripted theatre, in which much of a play's creative choices (e.g., writing a script, casting actors) are preplanned and may be made by designated individuals (e.g., the playwright) rather than collaboratively.

The most widely cited lesson of improv training, “Yes, and...” (e.g., DeMichele, 2015; Hines, 2016), addresses the need for improvisers to agree on the reality of a scene in order to move forward in it (Besser et al., 2013). Each improviser accepts the information their partner offers (the “yes,”) and adds more to it (the “and”) (Jagodowski et al., 2015; Hines, 2016). Depending on stylistic preference (Arnett, 2016), different teachers may emphasize different lessons related to “Yes, and...” such as behave and respond honestly (Jagodowski et al., 2015); find what is interesting or funny and explore that (Besser et al., 2013); or do something, notice

what you did, and keep doing that while processing your partner's choices through your character (Napier, 2004).

Applications of improv training abound. For example, Second City has a “Wellness Program,” offering distinct improv courses for those with anxiety or autism, for seniors, for clinicians (n.d.), and a “Professional Development Program,” offering distinct improv courses for workplace innovation, for public speaking, and for teachers (n.d.). The Applied Improvisation Network lists over 7,000 global members interested in using improv in non-theatrical settings for personal development, team building, creativity, innovation, and/or meaning-making (Tint & Froerer, 2014).

Emerging evidence for improv's applications.

Despite widespread applications, there is almost no experimental evidence for improv's benefits (e.g., Lewis & Lovatt, 2013; DeMichele, 2015). Historically, much of the applied literature has either used improv concepts as a metaphor to describe how organizations and their members handle unexpected circumstances, or reported on case studies, interviews, and anecdotal evidence (for a review, see Hadida, Tarvainen, & Rose, 2015). There is some evidence for improv's usefulness in the domain of mental health from two notable pre-post studies: Felsman, Seifert, and Himle (2018) link participating in improv to reduced social anxiety in low-income teens, and Krueger, Murphy and Bink (2017) link participating in improv to reduced generalized anxiety and depression and increased self-esteem among adult psychiatric patients.

There is also some evidence of improv's usefulness in the domain of creativity from recent quasi-experimental research (i.e., lacking random assignment). Creative teams involved in improv training (versus an inactive control) showed increased workplace playfulness and creativity (West, Hoff & Carlsson, 2017). Middle school students participating in improv (versus

sports) at lunchtime showed gains in creative flexibility and originality (Hainselin, Aubry & Bourdin, 2018). High school students in an improv class (versus a writing class) showed increased word and sentence usage (DeMichele, 2015). And, college students in an improv (versus consumer behavior) class showed increased creative fluency and greater self-efficacy on a marketing task measure (Mourey, 2019).

However, to establish a causal relationship between improv and psychological benefits, evidence from experiments with random assignment is needed (Cook et al., 2002; Aronson, Carlsmith, & Ellsworth, 1990). The randomized experiment (in which participants are assigned at random to treatment group) is the most compelling methodology for causal inference because group differences can be attributed to differences in the manipulated treatment rather than third variables such as the selection of participants (Cook et al., 2002; Aronson et al., 1990).

In the literature on specific benefits of improvisational theater, to our knowledge, only two randomized experiments have been published. They both concluded that even short sessions of improv cause increases in divergent thinking relative to a control condition with social interactions, among college students (Lewis & Lovatt, 2013), and among children (Sowden et al., 2015). Because brief social interactions can increase positive emotions and a sense of belonging (Sandstrom & Dunn, 2014a; Sandstrom & Dunn, 2014b; Argyle, 2013), it is important that these studies control for the non-specific effects of social interaction.

Increasing divergent thinking with improv.

Divergent thinking, the ability to explore multiple solutions to a given problem, is often contrasted with convergent thinking, the ability to arrive at a single appropriate solution (Lubart, 2016). Divergent thinking processes occur in a spontaneous and non-linear manner, so that many unique ideas can be generated in a short amount of time (Carr & Borkowski, 1987) and in

unexpected combinations (Walton, 2003). Although creative problem solving includes both convergent and divergent thinking (Cropley, 2006), divergent thinking ability is considered a reliable index of creative potential (Runco, 2017). Strategies to promote divergent thinking are important in part because creativity is increasingly valued in today's economy (Williams & McGuire, 2010).

Lewis and Lovatt (2013) argue that improv should increase divergent thinking compared to social interactions due to schemas; that is, everyday conversation draws heavily on preplanned social scripts and convergent thinking, whereas improv draws on a much wider variety of possible scripts and phrases, thereby engaging more creative, flexible and divergent processes. We add to this explanation the fact that the improv script is necessarily co-creative; as a result, the variety of available scripts and schemas are further combined in novel ways, increasing creativity.

Lewis and Lovatt (2013) measured divergent thinking ability through the Alternate Uses Task (AUT) (Guilford, 1967), perhaps the most common measure of divergent thinking in psychology (Dumas & Dunbar, 2014). In Lewis and Lovatt's experiment (2013), participants completed the AUT by generating as many alternative uses as possible for a common object (e.g., a paperclip; a remote control) before and after engaging in 20 minutes of improv or a matched control condition with social interaction activities. Examining divergent thinking subscales – fluency (number of legal responses), flexibility (number of response categories in their response set), elaboration (additional details in responses), and originality (uniqueness among a sample, conventionally given by 5% or fewer participants) – Lewis and Lovatt (2013) found that a short improv experience caused increased fluency, flexibility, and originality (but not elaboration) compared to a social interaction control condition.

That improv causes increases in divergent thinking (Lewis & Lovatt, 2013) helps explain the success of improv in creative fields such as business and entrepreneurship (Lubart, 2016). It also may help explain successful applications in mental health because flexible thinking is a goal of mainstream therapies (Clark & Beck, 1999), although creative performance has been historically associated with both career success and symptoms of psychopathology (e.g., Simonton, 2012).

Increasing uncertainty tolerance with improv.

The same features of improv training (moment-to-moment co-creative decisions) that may increase divergent thinking likely have other consequences. Of these, one that may distinguish improv experiences from everyday social interactions is that uncertainty about what will happen from one moment to the next is seen as desirable (Napier, 2004). Tolerance for uncertainty may have broad psychological benefits. To detect potential threats, uncertainty is often experienced as anxiety (Hirsh, Mar, & Peterson, 2012); however, even when no serious threat exists, uncertainty can lead to anxious behaviors such as avoidance and attentional biases (Herry et al., 2007). Indeed, intolerance of uncertainty has been recognized as a dispositional risk factor in anxiety and depression (e.g., McEvoy & Mahoney, 2012; Carleton et al., 2012), and thus a transdiagnostic target for mental health treatments (e.g., Carleton, 2012).

From a behaviorist perspective, improv may promote uncertainty tolerance via exposure, a key ingredient in traditional therapies (Wolitzky-Taylor, Zimmermann, Arch, De Guzman, & Lagomasino, 2015). Each successive moment in improvisation is one of many (perhaps infinite) possibilities; as such, an improv encounter provides direct and repeated experience with social uncertainty. The underlying mechanism for exposure as an effective treatment may be learned habituation, initial fear activation followed by fear reduction, or inhibitory learning in

emphasizing the development of new, non-threatening associations that become more accessible across time and context (Craske et al., 2008). Since improvisation involves encountering uncertainty in a non-judgmental, trusting and mutually supportive environment (Berk & Trieber, 2009), new associations developed through improv are likely non-threatening or even pleasant. Thus, if improv causes increases in uncertainty tolerance, such a relationship could provide a parsimonious explanation of its applications in broad domains of psychological health.

Experiment 1

No existing studies have tested whether engaging in improv causes increased uncertainty tolerance. Additionally, no experiment has replicated Lewis and Lovatt's (2013) finding that improv experience causes increases in divergent thinking in adults. To address these gaps, Study 1 aims to replicate the Lewis and Lovatt (2013) finding using the same outcome measure for divergent thinking while adding a measure of uncertainty tolerance. Since Lewis and Lovatt (2013) did not find any differences in Profile Of Mood States (POMS) scores (McNair & Heuchert, 2003) between their two groups (but did find an overall increase in positive emotions across conditions), we decided to replace the POMS with a common single-item affect measure in our replication (e.g., Kross et al., 2013). To measure uncertainty tolerance, we used Dalbert's Uncertainty Tolerance Scale (1996) as a pre- and post-treatment measure.

Lewis and Lovatt's (2013) study included a social interaction control condition that involved familiar interactions presumed to rely strictly on social scripts and schemas; for example, participants were asked to discuss their hobbies and university life. We modeled our social interaction control condition in Study 1 off of this premise. We also considered, however, that everyday conversation might be more like an improv experience when negotiated, flexible, playful, collaborative, and unstructured (e.g., two friends "riffing,") and less like improv when

following conventions and norms (e.g., ordering in a restaurant; Bower, Black, & Turner, 1979; Sawyer & Sawyer, 2003). Because improv experiences are defined by repeated encounters with the unplanned, we modified the social interaction control group tasks in Study 2 to be even less like improv by literally providing scripts to guide interactions.

Hypotheses. As in Lewis and Lovatt (2013), we expected that improv, relative to social interaction control, would cause increases in divergent thinking subscales, and that there would be no difference between conditions in affect (only an increase across conditions). We also expected that improv, relative to a social interaction control, would promote tolerance for uncertainty.

Method

Participants. Seventy-four undergraduates at a midwestern university ($M_{\text{age}} = 18.83$ years, $SD = 1.74$ years; 28 (37.8%) male, 46 (62.2%) female; 48 (64.9%) White, 24 (32.4%) Asian/Asian-American, 2 (2.7%) Black/African American) participated for course credit. This study received an exempt determination by the University of Michigan Institutional Review Board. All participants completed written consent forms.

Design Overview. This experiment was a conceptual replication of Experiment 1 in Lewis and Lovatt (2013). The 2 x 2 mixed design included a between-groups factor of interaction condition (*improv* or *control*) and a within-groups factor of time (pre- and post-treatment). Participants were randomly assigned to conditions and completed surveys before and after participating in a set of social interaction tasks. Replicating the Lewis and Lovatt (2013) paradigm required implementing the improvisation and social interaction control tasks following the published study (Lewis and Lovatt, 2013). Accordingly, we conducted short group experiences with either improvisational theater exercises or similarly structured social interactions (the control). Because

the information about the training tasks and how to present them in the prior study was limited (Lewis & Lovatt, 2013), we 1) modified exercises when necessary based on improvisational theater warm-up exercises (Spolin, 1999) and 2) fixed time dedicated to each task at two minutes, so that all seven tasks as well as added time for instructions and switching partners could be completed within 20 minutes. In the *improv* condition, participants engaged in exercises based on improvisational theater training as described in Lewis and Lovatt (2013). In the *control* condition, participants engaged in social interactions similar to the improvisational exercises but without the “co-creative” feature of improvisational theater (See Table 3.1 for more detail).

Improv condition. The *improv* condition included standard improvisation exercises designed to elicit moment-to-moment “co-creation.” The tasks started at a simple level, with participants reciting numbers or the alphabet in sequence (exercises 1 and 2) without a predictable order of turn-taking. Next, the experimenter explicitly described the “Yes, and” heuristic, saying, “A helpful strategy is to accept each other’s contributions and build on them.” Then, the group told a story by taking turns contributing one word at a time (3). Then, working with partners, one person mimed (silently enacted) a physical activity and their partner joined in, then switched roles (4); then, with a new partner, they described an imaginary person they “have in common” (5); next they took turns “mirroring” one another’s movements (6); finally, the experimenter offered another version of the “Yes, and” heuristic: “Try to use the information added by others. When someone introduces information, accept it as reality.” Then, the group as a whole discussed an imaginary movie they had “just seen together” (7). The task sequence was designed to increase in complexity, from joint recitation to co-creating physical movements and characters to synchronizing movements to discussing a shared (imaginary) experience (see Table 3.1 for more detail).

Control condition. The social interaction *control* condition included a matching set of tasks that were similar in structure to the *improv* exercises and also increased in complexity across the series. Participants first worked in groups to recite numbers and letters taking turns in a predictable order while standing in a circle (tasks 1 and 2); next, taking turns one word at a time around the circle, they recited lyrics to a standard song (3). then, working with partners, they named and then demonstrated physical activities for their partner (4); then, they each described someone they knew to one another (5); then, facing each other, participants maintained a non-spontaneous position and engaged in a staring contest (6). Finally, taking turns around the circle, they reported a movie they had seen to the group (7; see Table 3.1 for more detail).

Measures. Pre and post-treatment measures included standardized scale measures of affect (e.g., Kross et al., 2013), uncertainty tolerance (Dalbert, 1996), and divergent thinking (scored as fluency, flexibility, elaboration, originality; Guilford, 1967).

Affect. Lewis and Lovatt (2013) found no differences on the Profile of Mood States (POMS) scale (McNair & Heuchert, 2003) between *improv* and *control* conditions. To maintain the survey's brevity, we replaced the POMS with a widely-used single item measure of affective well-being (e.g., Kross et al., 2013; Felsman, Verduyn, Ayduk & Kross, 2017): "How do you feel right now?" with a scale from 0 ("very negative") to 100 ("very positive").

Uncertainty tolerance. To assess changes in tolerance of uncertainty, we used the Uncertainty Tolerance Scale (UTS), (Dalbert, 1996), which has been shown to have good reliability (Otto & Dalbert, 2010; Otto, Dette-Hagenmeyer, & Dalbert, 2004; Dette & Dalbert, 2005) and predictive validity (Otto & Dalbert, 2012). Lower scores on the UTS indicate that people tend to worry more, and view uncertain situations as more threatening (Otto & Dalbert, 2010). Higher scores predict higher psychic well-being, finding positive meaning in challenge,

participation in new learning contexts and enduring longer in an uncertain situation (Dalbert, 1999). Although the test has not been previously used as a within-subjects measure of change, its frequent use of the verb “to like” is consistent with attitudinal measures known to be sensitive to change (Bohner & Dickel, 2011). The scale included 8 items, such as “I like change and excitement,” “I like to try things out, even if nothing comes out of it,” and, “I like to engage in tasks for which there is a solution (reverse-scored).” Participants rated each item on a six-point scale, from 6 (*strongly agree*) to 1 (*strongly disagree*). In the current study, our pre-treatment UTS reliability (Cronbach $\alpha = .629$) and post-treatment reliability (Cronbach $\alpha = .743$) was comparable to UTS reliability reported in prior literature using this scale (Cronbach $\alpha = .710$; Bardi, Guerra, Sharadeh, & Ramdeny, 2009).

Divergent thinking. To measure changes in divergent thinking, we used the Alternative Uses Task (AUT) (Guilford, 1967), a widely-used measure (Kaufman, Plucker, & Baer, 2008). As in Lewis & Lovatt (2013), we administered an AUT before and after treatment, asking each participant to come up with as many different uses as they can for “a remote control” and “a paperclip.” The ordering of the two objects was randomized and counterbalanced across participants so that mean changes could be attributed to treatment and not differences in task materials. As in Lewis and Lovatt (2013), the instructions were as follows:

“You will be given the name of a common object. I would like you to list as many different uses for it as you can. This can be anything other than what the object was originally intended for. You will have three minutes to complete this task and write down as many alternative uses as you can. Are there any questions?”

Scoring the AUT. Three independent raters scored the AUT for fluency, flexibility, and elaboration following the instructions in Lewis and Lovatt (2013). Lewis and Lovatt (2013) used

expert coders (researchers with publications on creativity), but this was not feasible. Following recommendations on novice rater reliability (Baer, Kaufman, & Riggs, 2009), we recruited 3 upper level psychology students enrolled in a course on creativity as coders. Raters were trained by viewing and discussing a practice data set. Then, the raters worked independently to code the current study's full dataset while blind to both treatment and pre/post condition. Two-way random ICCs were calculated for each subscale to indicate inter-rater agreement on fluency, flexibility, and elaboration subscales. For the paperclip AUT, raters showed good reliability on fluency, ICC = .996, 95% CI [.994, .997], flexibility, ICC = .986, 95% CI [.979, .991], and elaboration, ICC = .822, 95% CI [.738, .882] judgments, based on criteria set in Cicchetti (1994). For remote control, AUT raters were similarly reliable on fluency, ICC = .975, 95% CI [.962, .983], flexibility, ICC = .959, 95% CI [.940, .973], and elaboration, ICC = .830, 95% CI [.750, .888]. Following Lewis and Lovatt (2013), the originality subscale was coded by evaluating the entire dataset of responses while blind to condition. A single coder created a lexicon of all responses, and each response produced by 5% or fewer participants received a point. A second coder independently assessed 10% of the data, and a comparison showed high reliability (Landis & Koch, 1977), Kappa = 0.938 ($p < 0.001$), 95% CI (0.869, 1.000) for paperclip; Kappa = 0.866 ($p < 0.001$), 95% CI (0.768, 0.964) for remote control. Where discrepancies occurred between coders, judgements were discussed to consensus.

Procedure. Participants arrived for the study and were placed in small groups of five to eight participants; each group was assigned at random to an interaction condition. The testing room included chairs arranged in a circle around the room, with open space in the middle for group and partner exercises. The experimenter sat at a separate desk in the front of the room and provided instructions for each activity.

Participants were told that the study “looks at how our social interactions relate to our attitudes and task performance,” and that they would complete several surveys about their emotions, behaviors, and experiences. They were also informed that they would engage in brief social tasks with the other participants in the study. The participants then completed the pre-treatment questionnaire.

Next, the experimenter guided the group through the set of activities in one of the two treatment conditions (assigned at random). The procedure followed the descriptions in Lewis and Lovatt (2013) for both the improvisation and control conditions as closely as possible. The first three and the final tasks were performed as a full group. The fourth through sixth were done in different subgroups of two (or three if a group had an odd number of participants). Groups in both conditions completed seven exercises within a total of twenty minutes.

Following the social interactions in both conditions, participants again individually completed the same measures of affect, uncertainty tolerance, and divergent thinking, followed by a few exploratory items and demographic information. The post-treatment survey included items to assess the training experience, feelings toward the study, enjoyment of the social interactions, willingness to repeat the study, and interest in improvisation classes. Because the participants were enrolled in an introductory psychology course, we also asked whether they had previous experience with the AUT.

Results

To test whether condition influenced any of our outcomes, as in Lewis and Lovatt (2013), one-way ANCOVAs were conducted with condition as a between-groups independent variable. Pre-treatment scores were entered as co-variates, and post-treatment scores as the dependent variable. See Table 3.2 for means and standard deviations of repeated measures.

Affect. Overall, participants' affect increased from pre-treatment ($M = 67.16$, $SD = 20.83$) to post-treatment ($M = 75.58$, $SD = 19.14$), $t(73) = 6.04$, $p < 0.001$, 95% CI (5.64, 11.20). However, this increase in affect did not differ by condition, $F(1,71) = 1.63$, $p = .206$, partial $\eta^2 = .022$ (see Figure 3.1).

Uncertainty Tolerance Scale. Overall, participants' uncertainty tolerance increased from pre-treatment ($M = 3.10$, $SD = 0.565$) to post-treatment ($M = 3.25$, $SD = 0.633$), $t(73) = 4.08$, $p < 0.001$, 95% CI (0.077, 0.225). However, this increase also did not differ by condition, $F(1,71) = .479$, $p = .491$, partial $\eta^2 = .007$ (see Figure 3.2).

Divergent Thinking. The measures of performance on the AUT suggest levels of divergent thinking similar to those observed in Lewis and Lovatt (2013). Participating in *improv* (versus *control*) predicted a marginal increase in fluency scores, and a significant increase in originality scores (see Figure 3.3 for means and standard errors and Table 3.3 for ANCOVA results and effect sizes). There were no significant differences between conditions on flexibility or elaboration subscales.

Post-experiment exploratory items. There were no significant differences between conditions in enjoyment of the experiment, willingness to repeat the study, familiarity with the AUT, prior experience with improvisation, or interest in taking an improv class.

Discussion

As in Lewis and Lovatt (2013), we found no differences in reported affect between *improv* and *control* participants. Although participating in the study was associated with feeling better, this improvement did not depend on condition. Also, as in Lewis and Lovatt (2013), divergent thinking differed between conditions. Improvising resulted in relative gains in fluency (marginally significant) and originality compared to engaging in the social interaction control.

While we found similar gains in flexibility as in Lewis and Lovatt (2013), this pattern was not significant. It is notable that originality was boosted by improv compared to control treatment because it is considered the most important of the AUT subscales for creativity (Runco & Jaeger, 2012). Also, originality is the only subscale found to consistently differ between conditions across the two experimental improv studies using this paradigm. Lewis and Lovatt (2013) showed improv increasing fluency, flexibility, and originality (but not elaboration), and Sowden, Clements, Redlich, and Lewis (2015) found improv increased elaboration and originality (though on a figural divergent thinking task). The differences between Lewis and Lovatt's (2013) AUT results and those reported in our Experiment 1 may reflect differences between coders; while Lewis and Lovatt (2013) used coders who had published research in the field of creativity, our coders were upper-level psychology students.

Finally, contrary to our hypotheses, we found that both treatments – improv experience and social interaction control – were associated with increases in uncertainty tolerance. This result was surprising because, as in Lewis and Lovatt (2013), the social control tasks were designed to be more familiar than the improv tasks, and thus involve less moment-to-moment unpredictability.

Experiment 2

We expected uncertainty tolerance would differ between our *improv* and *control* conditions in Experiment 1 because the *improv* tasks required students to generate ideas for what to say and do in the tasks on the spot. Typical social interactions (as in the control group) may include idea generation, but they are less like improv when following scripts, conventions and norms (e.g., ordering in a restaurant; Schank & Abelson, 1997; Bower, Black, & Turner, 1979; Sawyer & Sawyer, 2003). Even though the *control* tasks were designed to more closely resemble

everyday interactions (e.g., telling someone about a friend or a movie you've seen), participants still needed to generate ideas for the later, more complex *control* tasks. While tasks 1-3 provided the content (a "script" to be enacted), we recognized that creative input was required from the *improv* participants in tasks 4-7; specifically, deciding who and how to describe, which physical actions to demonstrate, what to do to win a staring contest, and which movie to talk about and how to describe it. While these *control* tasks were not co-creative with a partner (as in the *improv* condition), they required generating impromptu speech in a form of solitary improvisation (Cohen, 2015).

To better clarify the difference between our improvisation and control conditions in a second experiment, we identified a defining property of improv: Performance *without preparation or planning* (Halpern et al., 1994). We then revised the instructional scripts for the latter four control tasks, ensuring that participant contributions in the *control* interactions would be "prepared." Specifically, we created a list of gestures to perform, a character description to read aloud, specific times to depict using one's own arms as the hands of a clockface, and a movie description to read. These changes provided prepared content for the social interaction control groups to minimize their need to create new ideas during the tasks. However, the control tasks remained equivalent from Experiment 1 to Experiment 2 in the amount of social interaction occurring, the general content knowledge engaged, and the general purpose and length of each task, all of which, in both Experiments, were designed to match the improv tasks.

Method

Participants. One hundred thirty-one undergraduate students from a midwestern university ($M_{\text{age}} = 18.92$ years, $SD = 1.10$ years; 65 male, 66 female; 64.9% White, 19.1% Asian/Asian-American, 6.1% Black/African-American, 9.9% other (including Latino, Hispanic, and

multiracial) participated for course credit. This experiment received an exempt determination from the Institutional Review Board. All participants completed written consent forms before beginning the study.

Design Overview. The design (as in Experiment 1) was a 2 x 2 mixed design with condition (*improv* or *control*) between groups and time (pre- and post-treatment) within-groups. The only difference in Experiment 2 was the adjustment of four *control* group exercises to reduce the individuals' need to generate creative input during social interactions.

Improv condition. Participants in the *improv* groups engaged in the same improvisation tasks as in Experiment 1.

Control condition. As in Experiment 1, participants in the *control* groups engaged in exercises designed to be similar to the *improv* groups' exercises, but without encouraging moment-to-moment co-creative behavior. For four of the *control* tasks, we provided scripted materials to support interactions, limiting the need for individual creative ideas. Table 3.4 describes how these four exercises changed in more detail. For task 4, rather than choosing a physical action to demonstrate, participants followed a list of prepared gestures; for task 5, rather than describing someone they know, participants read aloud a written description of a film actor; for task 6, rather than a "stare down," participants demonstrated times of the day (announced by the experimenter) as if their arms were the hands of a clock; and in task 7, rather than describing a movie they have seen, participants read aloud a written movie description. These four changes made the social interaction control group tasks require less creative input from participants.

Measures. As in Experiment 1, pre and post-treatment measures included affect, uncertainty tolerance (measured by the UTS), and divergent thinking (measured by the AUT). As in Experiment 1, our pre-treatment UTS reliability (Cronbach $\alpha = .652$) and post-treatment

reliability (Cronbach $\alpha = .733$) was comparable to UTS reliability reported in prior literature using this scale (Cronbach $\alpha = .710$; Bardi et al., 2009).

Scoring the AUT. The same raters for the Experiment 1 AUT subscales scored the Experiment 2 AUT subscales following the same directions. The raters worked independently to code the current full dataset while blind to both treatment and pre/post conditions. For the paperclip AUT, two-way random ICCs calculated for each subscale indicated good agreement for fluency (ICC = .997, 95% CI [.996, .998]), flexibility (ICC = .987, 95% CI [.983, .991]), and elaboration (ICC = .782, 95% CI [.708, .840]), based on criteria set in Cicchetti (1994). For the remote control AUT, raters were again reliable on fluency (ICC = .955, 95% CI [.940, .967]), flexibility (ICC = .948, 95% CI [.931, .962]), and elaboration (ICC = .782, 95% CI [.709, .840]). Following Lewis and Lovatt (2013), originality scores were coded by evaluating the entire dataset of responses while blind to condition. A single coder created a lexicon of all responses, and each response produced by 5% or fewer participants received a point. A second coder independently assessed 10% of the data, and a comparison showed high reliability (Landis & Koch, 1977), Kappa = 0.766 ($p < 0.001$), 95% CI (0.680, .852) for paperclip; Kappa = 0.889 ($p < 0.001$), 95% CI (0.820, 0.958) for remote control. Where discrepancies occurred, cases were discussed to consensus.

Procedure. The procedure (aside from the different *control* tasks) was the same as in Experiment 1.

Results

As in Experiment 1, a 2x2 mixed design ANCOVA was conducted on the repeated measures: affect, uncertainty tolerance, and divergent thinking. Table 3.5 provides means and standard deviations for the repeated measures.

Affect. Overall ratings of affective well-being were similar to those in Experiment 1; that is, averaging 71.37 in Experiment 1 and 72.92 in experiment 2 on a 100-point scale. However, in Experiment 2, self-reported affect increased for participants in the *improv* relative to the *control* condition, $F(1,127) = 22.22, p < 0.001$, partial $\eta^2 = 0.149$ (see Figure 3.4).

Uncertainty Tolerance Scale. Unlike in Experiment 1, uncertainty tolerance scores increased for participants in the *improv* relative to the *control* condition, $F(1,128) = 5.33, p = 0.023$, partial $\eta^2 = .040$ (see Figure 3.5).

Divergent Thinking. Following Lewis and Lovatt (2013), one-way ANCOVAs were conducted on each AUT subscale with treatment condition as the between-groups factor (improvisation and control). When AUT pre-test scores were covaried out, participating in the *improv* (versus *control*) condition resulted in (marginally significant) increases in fluency, flexibility, and elaboration scores, but no increase in originality scores (see Figure 3.6 for means and standard deviations and Table 3.6 for ANCOVA results and effect sizes).

Discussion

The results of Experiment 2 suggest that improvisation (vs. a social interaction control) improves affect and uncertainty tolerance. While the improv tasks required participants to collaboratively create original ideas (e.g., describe a character), participants in Experiment 2's interaction control engaged in matched tasks supported by written directions about when and what to contribute (e.g., they read a description of a character, alternating paragraphs).

This provides the first evidence that improv causes increases in uncertainty tolerance and positive affect relative to a social interaction control. These effects can be attributed to distinguishing features of improv because the non-specific features of improv (e.g., content, social interaction, length) were designed to be highly similar across conditions.

Prior studies have shown that the autonomy experienced in creative tasks boosts affect (Bujacz et al., 2016). The improv training likely led to a relative gain in positive affect because the autonomy of participants in the control condition was relatively restricted. This difference is important because prior research (which did not use a scripted control) did not find that improv promoted affect relative to a control (Lewis & Lovatt, 2013).

Interestingly, although improv training resulted in nominally increased divergent thinking relative to a control, these differences were only marginally significant. One explanation is that even the highly structured social interaction control tasks (e.g., reading about a specific character or movie description aloud one paragraph at a time), forced participants to engage in novel interactions. Thus, improv's divergent thinking benefits may have been partly cancelled out by our social interaction task inadvertently engaging participants in novel situations.

General Discussion

Across two experiments, we found evidence that improvisational theater training (relative to a matched social interaction control) causes increases in divergent thinking, uncertainty tolerance, and affective well-being. Previous research has suggested ways to promote divergent thinking, often involving unhealthy behaviors (e.g. Jarosz, Gregory, & Wiley, 2012). Our replication of the impact of improvisation on creativity measures (Lewis & Lovatt, 2013) suggests a healthy and effective means of promoting creativity. In addition, improvisation may be a more cost-effective compared to more expensive methods, such as traveling abroad (Lee, Therriault, & Linderholm, 2012) and classes targeted at improving divergent thinking processes (Scott, Leritz, & Mumford, 2004; CPS Institute, 2019)

Prior work suggests that psychotherapies drawing on traditional psychotherapeutic methods can promote uncertainty tolerance (Carleton, 2012), which is implicated in broad issues

of mental health (e.g., McEvoy, 2012 & Mahoney; Carleton et al., 2012). Our finding that a brief (20 minute) session of improvisation training causes increases in uncertainty tolerance is important because it is potentially more accessible than traditional therapies, for which there are many barriers (Harvey & Gumport, 2015). It also suggests a mechanism for how improvisational theater overlaps with psychotherapy in producing positive changes (Bermant, 2013; Krueger et al., 2017), and why practitioners suggest that improvisation is, not just good for performance, it's good for life (e.g., Madson, 2005).

The two experiments found different effects based on the nature of the social interactions provided in the control treatment. This tracks the heterogeneity in social interactions more generally. More specifically, in Experiment 1, improvisation was compared to a social interaction control that involved more creativity, providing creative control (as in Lewis and Lovatt, 2013) over which friend they chose to talk about, which movie to discuss, and which physical actions to demonstrate; in Experiment 2, the social interaction control was limited to scripted tasks so that each individual's contributions were less creative, as in many forms of social interaction (e.g., buying a coffee, or greeting an acquaintance) and *only* improvisation tasks allowed participants to create or "write" the scripts for their interactions.

These unique comparisons relate to distinct psychological benefits. Improv as a co-creative process seems to be important in explaining its benefit for divergent thinking (as in Experiment 1). Improvisational co-creativity shakes up familiar schemas and scripts and encourages their flexible deployment to create novel combinations and get people thinking more uniquely (e.g., Lewis & Lovatt, 2013). The fact that improv is unscripted (vs. predetermined by a script) seems to be important in explaining its benefit for increasing uncertainty tolerance and feeling good (as in Experiment 2). Although most human interactions don't involve literal

scripts, their use does help offset the novelty of a lab study by providing some predictable or highly structured grounding for the tasks. Thus, these findings highlight two key qualities of improvisational theater: pleasant, intentional encounters with unpredictability (likely causing increases in uncertainty tolerance and affect in Experiment 2), and co-creative experiences with novelty (likely causing increases in divergent thinking in Experiment 1).

Limitations and future directions.

Scoring the results of creativity tasks often relies on non-expert raters (Amabile, 1982), as in the present studies. Baer and colleagues suggest that non-experts are adequate for simple creative tasks like generating sentences (2009) and the AUT is judged by non-experts in other work (e.g., Lucas & Nordgren, 2015). However, judgements of experts and non-experts sometimes diverge (Kaufman & Baer, 2012), and Lewis and Lovatt's (2013) studies employed expert researchers highly familiar with the AUT task. As a result, the larger effects of improv on later AUT performance in their work may be due to superior rater reliability or inferences about the task. While not as strong an effect, the present studies support the conclusion that divergent thinking is enhanced by improvisation training.

While we took care to follow Lewis and Lovatt's (2013) methodology as closely as possible, their report did not specify the length of each of the seven training tasks. It is possible our procedure (2 minutes for each of the 7 tasks and time for instructions for a total of twenty minutes overall) may have differed from the length of training in their study. Further, implementing their tasks in both training conditions involved some implementational assumptions. While the design of our experiment does not allow us to observe which tasks might be more or less important for driving the observed effects, a future study may investigate the impact of each training task more systematically.

An additional limitation is that the Uncertainty Tolerance Scale (Dalbert, 1996) was developed as a trait measure and not to our knowledge previously used to measure change in brief interventions such as our experiments. Since the effect sizes reported here are small, future work should 1) test whether the potency of improvisation for promoting uncertainty increases with duration (or “dose”), and 2) whether improvisation leads to longer term, lasting improvements in trait uncertainty tolerance.

While these two experimental studies provide the highest level of evidence on the factors influencing outcomes of improvisational theater training to date, certain confounds should be considered. For example, differences between conditions in uncertainty tolerance and affective well-being occurred only in Experiment 2; in that experiment, explanations for each change – pleasant unpredictability (believed to promote uncertainty tolerance) and creativity (shown to boost affect via experienced autonomy; Bujacz et al., 2016), are not tested separately. Future work is needed to test each of these explanations independently. Another example is that differences between conditions in originality were only significant in Experiment 1; in that experiment, participants in the improvisation condition co-created fictional characters and circumstances, whereas participants in the control condition contributed ideas based on their individual realities (e.g., talked about a familiar person or film). Hence, co-creative or imaginative thinking (which engages fictional status) could explain the effect of improvisation on originality and future controls may separate these explanations.

Conclusions.

Training in improvisational theater is widely available, and seen as a popular and entertaining activity. It is also believed to produce a variety of psychological benefits. It is associated with reductions in anxiety and depression in adult psychiatric patients (Krueger et al.,

2017), as well as reductions in social anxiety among adolescent public-school students from a non-clinical sample (Felsman et al., 2018). However, research on its benefits has generally lacked the rigor of randomized experiments. This paper highlights two important features of improvisation as an intervention: 1) it engages co-creativity and idea discovery by working with others, and 2) it is unpredictable because the “script” is generated in the moment. While other social interactions may offer similar benefits, improvisation is shown in these experiments to produce benefits beyond every day, routinized social interactions.

This paper replicates a prior finding that improvisational theater training can improve divergent thinking (e.g., Lewis & Lovatt, 2013), and provides new findings that it can boost positive affect and increase uncertainty tolerance relative to other social interactions. As a means to enhance psychological health, improvisational theater training can offer benefits without the negative stigmas and difficulties in access surrounding other therapeutic interventions. These results support its popular use beyond the theater to improve social and personal performance in a variety of settings (e.g., Tinter & Froer, 2014).

Table 3.1. Experiment 1 treatment condition tasks and descriptions.

Task		Improv		Control	
	Task	Description	Task	Description	
1	Group	Unstructured counting	Count up to twenty, one number at a time. There shouldn't be an order to who speaks. If two people speak at once, restart.	Structured counting	Count up to twenty, one number at a time. Take turns by going clockwise in a circle. When finished, repeat.
2	Group	Unstructured alphabet	Recite the alphabet, one letter at a time. There shouldn't be an order to who speaks. If two people speak at once, restart at.	Structured alphabet	Recite the alphabet, one letter at a time. Take turns by going clockwise in a circle. When finished, repeat.
3	Group	Word at a time original content	Going around the circle, each person will add one word at a time to form a coherent story. If a story is completed, begin a new one.	Word at a time familiar content	Going around the circle, each person will add one word at a time to recite the first verse of <i>Twinkle Twinkle</i> ³ . If finished, repeat.
4	Partner	Co-creating physical reality	Without speaking, one person will demonstrate a physical activity. When their partner can guess what it is, they will join in with the same physical activity. When the experimenter says, reverse roles.	Imitating physical action	One person will name a physical activity and then demonstrate it. Without speaking, when the experimenter says, their partner will join in with the same physical activity. When the experimenter says, reverse roles.

³ For the first control group, we used the *Michigan Fight Song* because some students were not familiar with *Twinkle Twinkle, Little Star* (used in Lewis & Lovatt, 2013). However, in the first group, some students did not know the words to the fight song. So, all other control groups had a printed lyric sheet with the first verse of *Twinkle Twinkle*.

5	Partner	Co-creating a character	Pretend you know someone in common. Taking turns, describe that person.	Describing someone	Taking turns, describe someone you know.
6	Partner	Mirroring spontaneous movement	Imagining you are each your partner's mirror image, one person will initiate movement that their partner will mirror, without speaking. When the experimenter says, reverse roles.	Partner-facing non-spontaneous movement	Engage in a staring contest with your partner, without speaking. When the game ends, repeat.
7	Group	Co-creating a shared experience	Pretend you have all just seen a movie called "Transformation." Have a group discussion about the movie.	Discussing an experience	Describe a movie you have seen. Take turns by going clockwise in a circle.

Table 3.2. Experiment 1 mean (S.D.) pre- and post-treatment repeated measures.

Repeated Measures	Improv (<i>n</i> = 37)		Control (<i>n</i> = 37)	
	Pre	Post	Pre	Post
Affect	67.92 (22.17)	74.54 (21.42)	66.41 (19.68)	76.62 (16.79)
Uncertainty Tolerance	3.04 (.488)	3.22 (.532)	3.16 (.635)	3.29 (.727)
Fluency	6.76 (3.18)	7.23 (2.67)	5.73 (2.92)	5.76 (2.81)
Flexibility	6.36 (2.96)	6.50 (2.40)	5.26 (2.48)	5.37 (2.65)
Elaboration	2.99 (2.10)	3.18 (2.35)	2.76 (1.56)	2.77 (2.48)
Originality	2.32 (1.78)	3.03 (1.91)	2.14 (2.24)	1.81 (1.68)

Table 3.3. Experiment 1 summary ANCOVA table for AUT subscales.

AUT Subscore	Co-variate: pre-score	ANCOVA (partial η^2)
Fluency	$F(1, 71) = 68.23^{***}$	$F(1, 71) = 3.19^* (0.043)$
Flexibility	$F(1, 71) = 68.14^{***}$	$F(1, 71) = .961 (0.013)$
Elaboration	$F(1, 71) = 29.31^{***}$	$F(1, 71) = .273 (0.004)$
Originality	$F(1, 71) = 2.87^*$	$F(1, 71) = 8.20^{**} (0.104)$

*marginally significant ($p = .079, .094$), ** $p = .005$, *** $p < 0.001$

Table 3.4. Changes to control tasks from Experiment 1 to Experiment 2.

	Group/ Partner	Task	Experiment 1 Control	Experiment 2 Control
4	Partner	Imitating physical action	One person will name a physical activity and then demonstrate it. Without speaking, when the experimenter says, their partner will join in with the same physical activity. When the experimenter says, reverse roles.	As the experimenter calls them out, take turns demonstrating the physical gesture from the list of 30 gestures.
5	Partner	Describing someone	Taking turns, describe someone you know.	Taking turns, one paragraph at a time, read aloud the description of an actor you were given.
6	Partner	Partner-facing non-spontaneous movement	Engage in a staring contest with your partner, without speaking. When the game ends, repeat.	As the experimenter says, take turns demonstrating a time of day to your partner, as if your arms are the hands of a clock, so your partner can read the time.
7	Group	Discussing an experience	Describe a movie you have seen. Take turns by going clockwise in a circle.	Taking turns, one movie at a time, read aloud the descriptions of movies you were given.

Table 3.5. Experiment 2 mean (S.D.) pre- and post-treatment repeated measures.

Repeated Measures	Improv (<i>n</i> = 67)		Control (<i>n</i> = 64)	
	Pre	Post	Pre	Post
Affect	68.33 (20.25)	76.31 (17.94)	75.94 (16.55)	72.14 (18.14)
Uncertainty Tolerance	3.27 (.554)	3.49 (.608)	3.20 (.480)	3.25 (.585)
Fluency	6.47 (2.76)	7.13 (3.12)	5.92 (2.96)	5.99 (3.09)
Flexibility	6.21 (2.55)	6.81 (2.83)	5.59 (2.60)	5.69 (2.83)
Elaboration	2.33 (2.00)	2.54 (1.79)	2.54 (2.00)	2.07 (1.94)
Originality	2.12 (1.54)	2.30 (2.22)	1.55 (1.55)	1.89 (1.77)

Table 3.6. Experiment 2 summary ANCOVA table for AUT subscales.

AUT Subscore	Co-variate: pre-score	ANCOVA (partial η^2)
Fluency	$F(1, 128) = 33.38^{**}$	$F(1, 128) = 3.17^* (0.024)$
Flexibility	$F(1, 128) = 28.56^{***}$	$F(1, 128) = 3.28^* (0.025)$
Elaboration	$F(1, 128) = 31.54^{***}$	$F(1, 128) = 3.62^* (0.027)$
Originality	$F(1, 128) = 14.83^{***}$	$F(1, 128) = .244 (0.002)$

*marginally significant ($p = 0.077, 0.072, 0.059$), *** $p < 0.001$

Figure 3.1. Experiment 1 mean affect ratings and standard errors at pre- and post-treatment.

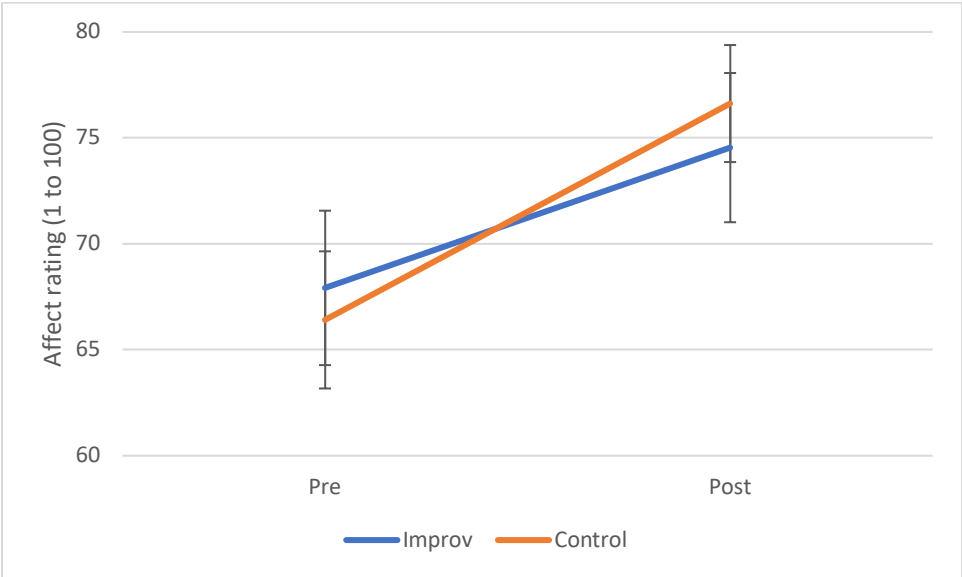


Figure 3.2. Experiment 1 mean UTS ratings and standard errors at pre- and post-treatment.

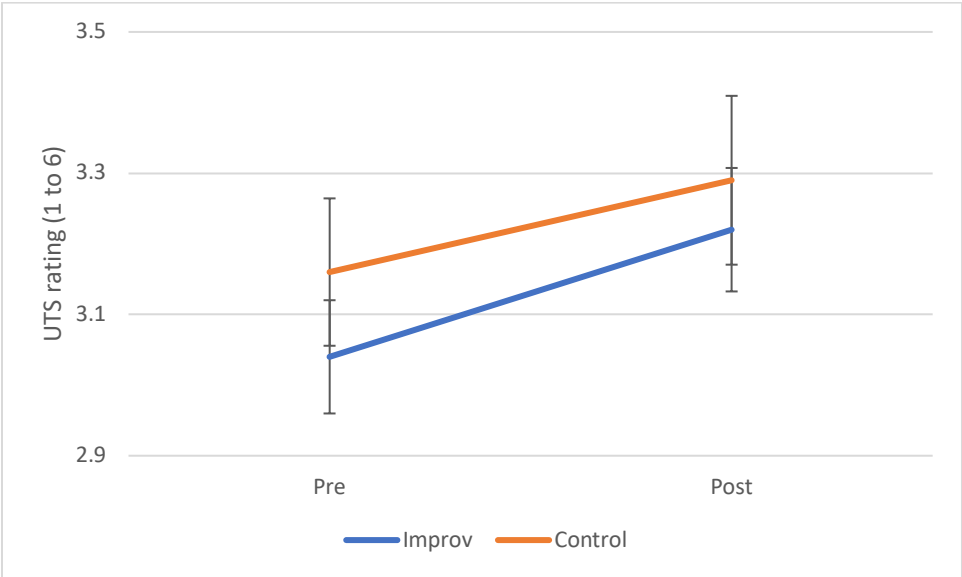


Figure 3.3. Experiment 1 AUT subscale means and standard errors at pre- and post-treatment.

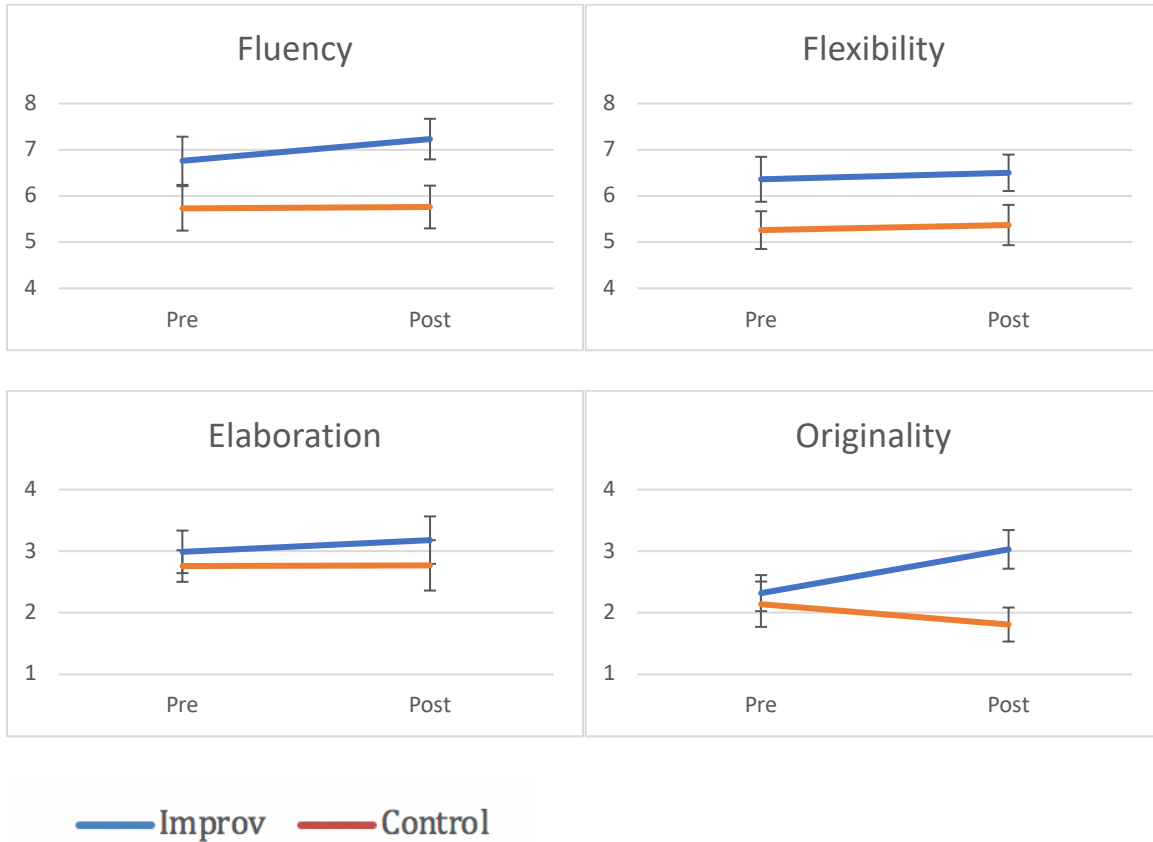


Figure 3.4. Experiment 2 mean affect ratings and standard errors at pre- and post-treatment.

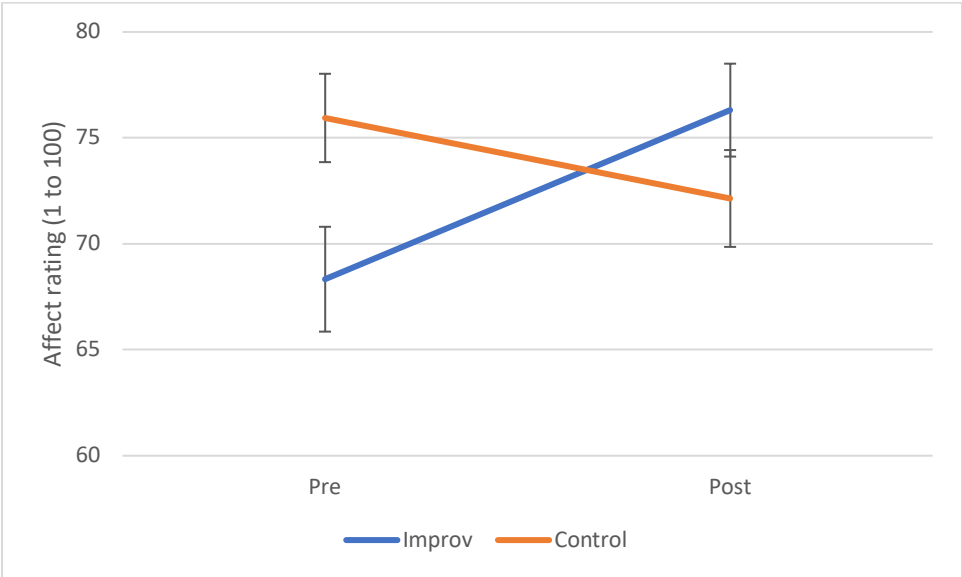


Figure 3.5. Experiment 2 mean UTS ratings and standard errors at pre and post-treatment.

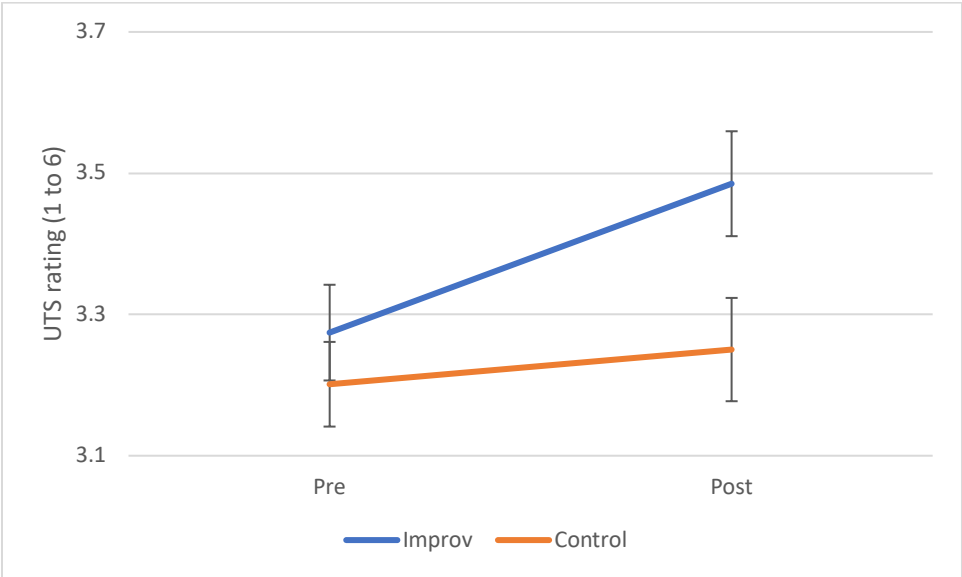
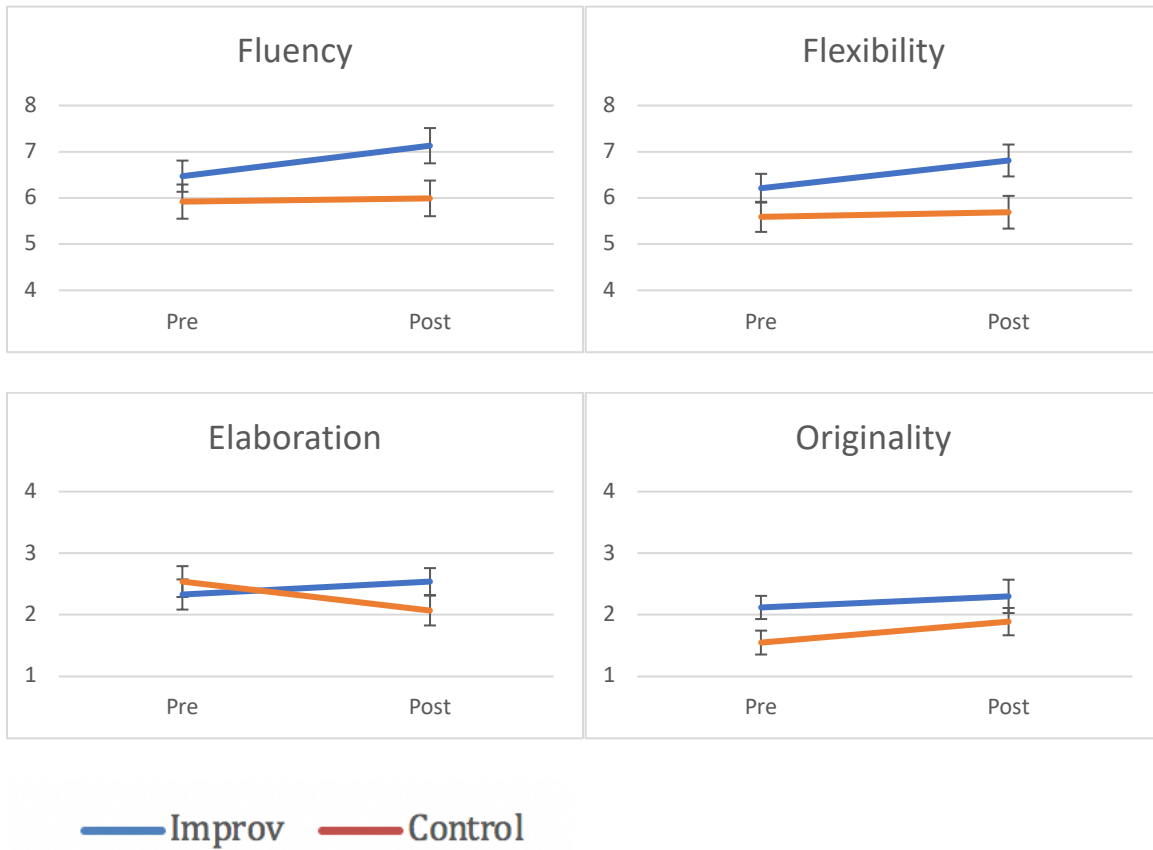


Figure 3.6. Experiment 2 AUT subscale means and standard errors at pre- and post-treatment.



Chapter 4: Reducing Social Anxiety and Uncertainty Intolerance in Adolescents with Improvisational Theater

Improv for social anxiety.

Adolescents are particularly vulnerable to experiencing social anxiety (Knappe, Sasagawa, & Creswell, 2015), which often persists into adulthood (Schneier et al., 2014). Social anxiety is defined by fear or avoidance of social situations that involve the possibility of being scrutinized (American Psychiatric Association, 2013) and predicts higher levels of drug dependency, drug problems, and unemployment, lower levels of socioeconomic class, household income, quality of life, and educational achievement (Patel et al., 2002; Asher, Asnaani, & Aderka, 2017). It has been proposed that participating in improvisational theater (improv) – the theatrical co-occurrence of creative process and product (Snowden et al., 2015), might reduce social anxiety via exposure (e.g., Felsman et al., 2018) in part because improv involves repeated exposure to social interactions with an audience of potential scrutinizers.

Exposure is a key ingredient of widely used, empirically supported therapies such as cognitive-behavioral therapy (CBT) (Hofmann et al., 2010). As a component of CBT, exposure consists of graduated exercises targeting individual concerns (e.g., public speaking), and helping people encounter previously avoided experiences or testing potential cognitive errors. However, exposure is often underused (Wolitzky-Taylor et al., 2015). The underlying mechanism of effectiveness may include learned habituation, initial fear activation followed by fear reduction, or inhibitory learning, emphasizing the development of new, non-threat associations that become more accessible across time and context (Craske et al., 2008). Through either mechanism,

exposure to social performance with the possibility of scrutiny is a sensible, face valid explanation for why improvisational theater training might be beneficial for those who tend to fear or avoid such situations. Indeed, one recent study found that in an urban school-based, mostly low-income, mostly minority sample of adolescents, participating in an improv training program (*The Improv Project*) was associated with significant reductions in social anxiety (Felsman et al, 2018).

Improv for uncertainty tolerance.

Improv is unique from traditional exposures that emphasize social performance because interactions in improv are intentionally uncertain (Napier, 2004). When exposure is used within the methods of traditional therapy, exercises are often “well planned” (Abramowitz, Deacon, & Whiteside, 2011, p. 122). In contrast, improvisation experiences are structured such that each successive moment is one of infinite possibilities. Consequently, any improvisational encounter is a direct and repeated encounter with uncertainty about what will occur next. For example, if two people are improvising a story together, they will each introduce novel and unplanned ideas that their partner could not have predicted but must accept and build upon.

The implication is that improv may, in addition to serving as an effective exposure method for social anxiety, function as an exposure method for those with anxiety about uncertainty. Uncertainty – the extent to which competing actions and perceptions might bear on a given situation (Hirsh et al., 2012) – can elicit anxiety (Grillon, Baas, Lissek, Smith, & Milstein, 2004; Herry et al., 2007). In evolutionary history, this may have helped with threat detection (Hirsh et al., 2012). However, uncertainty anxiety can also arise and have negative consequences even when no serious threats exist. For example, exposure to unpredictable (versus

predictable) patterns of sound (i.e. non-threatening uncertainty) can lead to behavioral avoidance as well as attentional bias towards negative (versus neutral) expressions (Herry et al., 2007).

Two main logical strategies exist for dealing with uncertainty anxiety. The first is to reduce the primary source – the uncertainty that elicits anxiety in the first place. Since any situation offers a range of perceptual and behavioral possibilities (Gibson, 2014), a person can reduce uncertainty by gaining knowledge about the environment and the appropriate responses to make in order to further valued goals (Peterson, 1999; Peterson & Flanders, 2002). However, attempts to reduce short-term anxiety and uncertainty with concrete plans and behavioral restraints (if too rigid) may result in a failure to adapt to changing circumstances and pathology (e.g., Bickhard, 1989). Thus, a second and arguably more desirable strategy to reduce uncertainty anxiety is to increase one’s tolerance of uncertainty in the world.

Indeed, uncertainty tolerance has gained attention among researchers in recent years, who recognize *intolerance of uncertainty (IU)* as a dispositional risk factor for the development and maintenance of anxiety and depression (e.g., McEvoy & Mahoney, 2012; Carleton et al., 2012). Carleton (2012) argues that to some extent “all therapies can be described as attempts to mitigate IU” (p. 942), by removing threats, increasing certainty and creating coping capacity, and that increasing tolerance for uncertainty “may well provide the most pervasive benefits” (p. 942). It is not surprising then that specific psycho-therapeutic treatments have been developed to target uncertainty tolerance (e.g., Dugas & Ladouceur, 2000) and (the closely related) tolerance of ambiguity as a treatment goal (e.g., S. Hayes et al., 2006; Yapko, 2010).

In improv training, repeated uncertainty is coupled with a non-judgmental, trusting and mutually supportive environment (Berk & Trieber, 2009). Therefore, improvisers are likely to form non-threatening or even pleasant associations with uncertainty across time and scenarios,

which (from an inhibitory learning perspective) should reduce uncertainty-related anxiety (Craske et al., 2008). As in traditional therapy, exposure to uncertainty tolerance in the context of improvisational theater may also be graded through the magnitude of uncertainty inherent in a structured exercise. For example, a beginning exercise may involve playing tug of war with an imaginary rope, whereas a more advanced exercise may involve spontaneous character exploration and emotion (Spolin, 1983).

If improv increases uncertainty tolerance as we theorize, such a link could offer a parsimonious explanation for improv's broader psychological health implications. For example, improv has been associated with reductions in social anxiety (Felsman et al., 2018) as well as generalized anxiety and depression (Krueger et al., 2017). Since uncertainty intolerance has already been implicated in the development and maintenance of anxiety disorders and depression (e.g., McEvoy & Mahoney, 2012; Carleton et al., 2012), a link between improv and uncertainty intolerance may help clarify why doing improv has psychological benefits.

Improv as accessible alternative mental health intervention.

One of the most attractive features of improv training as an alternative method of mental health intervention is its accessibility. This is highlighted in the opening lines of Viola Spolin's seminal book, *Improvisation for the Theater* (1983, p.3): "Everyone can act. Everyone can improvise." In contrast, a litany of obstacles prevent most of the people who might benefit from mental health services from ever receiving them (e.g., logistical inconvenience, financial costs, social stigma, a need to make informed decisions, and a lack of motivation) (Harvey & Gumpert, 2015).

There are several other reasons people may not engage with traditional mental health treatments. For example, a therapist working with a client to reduce uncertainty anxiety in a

more traditional cognitive behavioral framework might a) guide the client to reevaluate anxious beliefs such as “worrying helps to keep my kids safe” when doing so has no bearing on the future, b) orient a client to problem-solve for situations amenable to doing so, or c) identify key sources of worry not amenable to problem-solving and use them for cognitive exposures (Dugas & Ladouceur, 2000). These exposures might involve first audio recording a description of a feared scenario (e.g., being fired from work), and then listening to it on a loop every day until it no longer provokes anxiety (Dugas et al., 2003). Although helpful to many, some people may experience a therapist’s questioning of their beliefs as invalidating (Lynch, Chapman, Rosenthal, Kuo, & Linehan, 2006), find problem-solving futile or even harmful (Hayes et al., 2006), or feel unmotivated to engage in traditional exposures (e.g., experiencing the prospect of engaging in a feared scenario such as attending a party of strangers as unpleasant or unattractive) (Harvey & Gumport, 2015). In contrast, improv may be particularly appealing for this group because it emphasizes mutual validation (Fotis, 2014), acceptance (Tint & Froerer, 2014), and playfulness (West et al., 2017).

These barriers to treatment are reduced by school-based improvisational theater programs, which offer an especially low-stigma, low cost, accessible alternative method of mental health intervention. Adolescent-identified barriers to accessing mental health treatment include embarrassment, not wanting to talk about mental health problems, and not trusting clinicians (Chandra & Minkovitz, 2006; Lavik et al., 2018). A school-based improv training program such as *The Improv Project* (as described in Felsman et al., 2018) overcomes these barriers because: 1) it is set within class as usual, rather than identifying specific individuals as “in need of treatment,” 2) it uses group activities to reward behaviors known to benefit psychological health (e.g., interpersonal trust, and peer support; Berk & Trieber, 2009), rather

than talking about mental health directly, and 3) it employs theater instructors rather than professional psychologists or counselors to provide the training (Felsman et al., 2018).

Although there is evidence that school-based improv training reduces social anxiety (Felsman et al., 2018), generalized anxiety and depression (Krueger et al., 2017), no published study has tested whether engaging in improvisational theater leads to increases in uncertainty tolerance, which might explain broad intervention effects. There is evidence that engaging in improvisational theater training predicts increases in willingness to make mistakes (Felsman, et al., 2018). Since uncertainty tolerance is inversely related to self-directed perfectionism (Buhr & Dugas, 2006) – or, the reluctance to make mistakes – this can be viewed as indirect support for the hypothesis that improvisation promotes uncertainty tolerance. Nonetheless, an empirical test is needed to evaluate whether engaging in improvisation leads to increases in uncertainty tolerance.

Study Overview.

The current study examines the impact of a school-based 10-week multi-site improvisational theater course (*The Improv Project*) among middle and high school students in a large Midwestern city, using a single group, pre/post design. First, we investigate whether participating in an improvisational theater class predicts changes in uncertainty tolerance, reductions in social anxiety, and increases in social self-efficacy. This last outcome was included because prior work shows a link between engaging in improv and increased social self-efficacy (Felsman et al., 2018), and because a lack of social self-efficacy is associated with more social anxiety (Leary & Jongman-Sereno, 2014).

This study also replicates prior work which tests whether participating in improv is associated with psychological benefits for those screening positive for social phobia (Felsman et

al., 2018). Finally, we test whether uncertainty intolerance can explain variance in changes in social anxiety.

Method

The Improv Project.

The Improv Project is the ten-week school-based improvisational theater program conducted by The Detroit Creativity Project (DCP) in collaboration with Y-Arts Detroit. The goal of the school-based improv program is to inspire young people to build confidence and develop a creative and collaborative approach to their lives. Instructors are improv teachers in the Metro Detroit area who visit the participating schools. A program coordinator acts as the liaison between the school representatives and the instructors, and monitors the program across sites. The 10-week program takes place during normal class time or after school programming in middle and high schools in and around Detroit, Michigan.

Schools participating in *The Improv Project* meet the following requirements: 1) they are willing to promote the project to their students, 2) they offer a dedicated space for the class, 3) their class size is 8-15 students per instructor, 4) consistent student participation is scheduled weekly, and 5) a classroom teacher acts as a point of contact at the school, is present during each class, and meets with the program coordinator to set clear policies regarding check-in, parking, and disruptive students. Special preference is given by the project organizers to middle and high schools with 1) an existing theater arts program, 2) a school mission that includes a stated focus on college/career readiness, 3) a representative who has communicated enthusiasm for the program, and 4) participation by students considered “in need” based on free/reduced lunch eligibility and lower/poor performance on the reading/writing sections of state/national tests.

Based on available demographic information on school websites, the student body at the schools included in *The Improv Project* were comprised of mostly ethnic minorities (primarily Hispanic or Latino, Black or African American), with a roughly even gender split. Most participants in *The Improv Project* qualified for free or reduced lunch meal programs and were considered economically disadvantaged by state standards.

The Improv Project instructors are recruited and trained through the Detroit YMCA's Y-Arts Department. The team of instructors meet each term for additional training and program refinement. They also share similar improvisational theater experience, drawing largely on the work of Viola Spolin and the tradition of Second City. To ensure consistency between sites, instructors use a standardized syllabus scheduling work on the same skills across classes. Weeks 1-8 include both improv skills and life skills (e.g., described in Felsman et al, 2018). In the term described in this paper, a slightly modified version of the syllabus was used at three of the twelve participating schools to emphasize debriefing and discussion of relevant life skills.

Participants. 350 students completed pre-test surveys on the first day of class, and 339 students completed posttest surveys, all on the last day of class (See Table 4.1). Students' grade level (from surveys) ranged from 8th through 12th.

Measures.

Social Self-Efficacy. Our measure of social self-efficacy was based on a shortened version of the 25-item Adolescent Social Self-Efficacy Scale (Connolly, 1989) with a few items modified slightly for fluency. To meet length limitations, and because we were less interested in this construct than social anxiety and uncertainty intolerance, we used only a 3-item version of the scale –the three items that best predicted overall score in pilot data. These items described the following social challenges: “Put yourself in a new and different social situation,” “Start a

conversation with a boy or girl who you don't know very well," and "Attend an event where you are sure you won't know any of the kids." Participants were instructed to rate how difficult it would be for them to do each of these actions on a 7-point scale from 1 (*Extremely Easy*) to 7 (*Impossible*). Responses on these three items were reverse-scored and averaged over items for each student, with a higher score indicating greater confidence in social skills.

Social Anxiety. Our measure of social anxiety was the widely used 3-item Generalized Social Anxiety Disorder screener, the Mini-SPIN (Connor et al., 2001). These items described core symptoms of social anxiety: "Fear of embarrassment causes me to avoid doing things or speaking to people," "I avoid activities in which I am the center of attention," and "Being embarrassed or looking stupid are among my worst fears." Participants were instructed to rate "how true" each of items was about themselves on a 5-point scale from 0 (*Not at all*) to 4 (*Extremely*). Scores were summed for each student, with higher scores indicating a higher likelihood of screening positive for social anxiety disorder (i.e. SAD; also referred to as social phobia). We used the recommended screening cutoff of 6, which has been shown to have good sensitivity and specificity for detecting SAD (Connor et al., 2001), identifying 86% of adolescents who are diagnosed with SAD by professionals (Ranta, Kaltiala-Heino, Rantanen, & Marttunen, 2012).

Intolerance of Uncertainty. Our measure of uncertainty intolerance was the Brief Intolerance of Uncertainty Scale (Brief-IUS), which predicts worry and anxiety in children and adolescents. This five item scale includes those with the greatest item-total correlations reported in prior literature from the longer Intolerance of Uncertainty Scale (Fialko, Bolton, & Perrin, 2012). Participants were instructed to rate "how characteristic" each of the items was about themselves (e.g. "Not knowing what may happen next can make me scared or sad.") on a 5-point scale from

0 (*Not at all*) to 5 (*Entirely*). Here, scores were averaged over items for each student, with a higher score indicating greater intolerance of uncertainty.

Single time-point items. On the pre-test survey only, based on open-ended responses from a prior evaluation, we had students rate their previous experience with improvisation from 1 (*I have no experience with improvisation*), to 4 (*I have taken an improv class before this one*). On the post-survey only, we included three existing program evaluation items, such as “I know what ‘yes, and’ means,” and “I can use what I learned in improv in other parts of my life.” Students rated how true each item was for them from 1 (*Not at all*) to 5 (*Entirely*). Finally, students also rated their overall class engagement on the post-survey, assessed by agreement with the statement, “I was fully engaged in this program when I was in class.” Students were instructed to rate how true this item was for them, on a scale from 1 (*Not at all*) to 5 (*Entirely*). Previously, this item was found to be positively correlated with teacher-reported engagement ($r = .425, p < .001$) (Felsman et al., 2018). Further, of the 47 students who reported that they were “very much” or “extremely” engaged in the program, 98% (all but one) were rated by their teachers that term as at least “somewhat” engaged, offering some convergent validity for the self-report item.

Analysis plan. To answer our research questions about the relationship between improvisational theater training and changes in uncertainty intolerance, social anxiety, and social self-efficacy, we first examined unadjusted change scores in each of the three measures. To examine adjusted change score means, we first checked whether assuming that Missing At Random was a reasonable assumption for missing data, a binary indicator for “missing at follow-up” was created. Then, all outcomes and covariates were compared by the binary missingness indicator by a t-test for numerical outcomes. For categorical variables, the Pearson chi-square test was used if the expected value for each cell was ≥ 5 and the Fisher exact test was used for variables

with small cell counts. Any covariate theoretically associated with the outcome or significantly associated with the missingness indicator was included as a covariate in the outcome analysis (Allison, 2002).

Next, we fitted linear mixed models for each outcome with covariates of indicators for weeks 1 and 10, along with grade, syllabus, past experience with improv and engagement. Syllabus was part of the model to adjust for differences that could be attributed to the version of the course received. To account for the clustering effects of schools and classrooms within schools, random effects for school and classroom (within school) were also included in the models. Linear mixed models allow for correlation among observations on the same person and allow participants to be included in the analysis if they had data at baseline or follow-up (Diggle, Heagerty, Liang, Zeger, 2002; West, Welch, & Galecki, 2014; SAS Institute, 2019).

We then tested whether screening positive for social phobia predicted differences in change scores and then to replicate prior work, examined unadjusted change scores within the subsample that screened positive for social phobia. We then examined adjusted changes in this subsample.

Finally, we examined whether change in uncertainty intolerance explains change in social anxiety. First, we generated a correlation matrix of change scores in social anxiety, uncertainty intolerance, and covariates from our adjusted change score models: social self-efficacy, syllabus, grade, experience and engagement. Then, to test whether change in uncertainty intolerance predicted change in social anxiety, we fitted a linear mixed model with change in social anxiety as the outcome, with covariates of baseline social anxiety, changes in uncertainty intolerance and social self-efficacy, grade, syllabus, experience and engagement. Again, random effects were

included to account for clustering by school and by classroom within school. We checked that multicollinearity was not a problem by computing the variance inflation factor (vif) for each variable and confirming that all vif's were under 10. Grade was included in the model as an ordinal covariate, (grade – 8), because the Akaike Information Criteria (AIC) (Akaike, 1974) and Bayesian Information Information Critieria (BIC) (Schwarz, 1978) indicated better fit with grade ordinal, rather than as binary indicators for specific grades.

Results

Baseline descriptives. At baseline, mean participant Mini-SPIN score was 5.11 ($SD = 3.39$), Brief-IUS score was 2.08 ($SD = 0.89$), and social self-efficacy score was 4.35 ($SD = 1.28$). Roughly 17.5% of the students received the applied (vs. standard) improv syllabus. The grade distribution of the participants was 41.61% 8th grade, 5.06% 9th grade, 12.18% 10th grade, 11.95% 11th grade, and 29.20% 12th grade. Fourteen schools were represented and three of these schools had two classrooms offering improv. The mean engagement was 3.70 ($SD = 1.16$) on a 1-5 scale. 76.51% of the 332 students who reported their previous experience had not taken an improv class before this one.

Missing Data. Based on t-tests, neither the mean baseline mini-spin, uncertainty intolerance, nor social self-efficacy differed significantly by whether follow-up data was present. In addition, neither engagement (t-test) nor experience were associated with missingness. However, specific schools and students in higher grades were more likely to be missing follow-up data, and students receiving the applied syllabus were more likely to not be missing follow-up data. Because the probability of missing follow-up data was not associated with any of the outcomes, we concluded that Missing At Random (MAR) was a reasonable assumption. School,

syllabus and grade were included in the adjusted models, both because of their hypothesized relation to the outcome and because they were predictors of missing follow-up data.

Does improvisational theater training predict change in uncertainty intolerance, social anxiety, and social self-efficacy?

Unadjusted change. From baseline to follow-up, the unadjusted changes revealed significant decreases in the Brief-IUS ($M = -0.20$, 95% CI [-0.30, -0.09], $p < 0.001$), and the Mini-SPIN ($M = -0.58$, 95%CI [-0.93, -0.23], $p = 0.001$), and a non-significant increase in social self-efficacy ($M = 0.12$, 95% CI [-0.03, 0.26], $p = .109$). Using Cohen's d , the effect sizes for these changes were 0.23 for the Brief-IUS, 0.20 for the Mini-SPIN, and .10 for social self-efficacy, all in the small range for effect sizes.

Adjusted change. Adjusted estimates from the linear mixed models followed the same pattern as the unadjusted estimates, with significant drops in the Brief-IUS and Mini-SPIN, but no significant change in social self-efficacy. Grade, experience, and engagement were included in the models as continuous variables. The Akaike and Bayesian Information Criteria indicated that the models fit better with grade continuous, rather than categorical. Due to small cell sizes, neither experience nor engagement were tested as categorical variables. See Table 4.2 for a summary of adjusted change estimates.

Adjusted change in intolerance of uncertainty. The model testing mean change in the Brief-IUS revealed significant reductions from baseline to follow-up ($M = -0.19$, 95% CI [-0.30, -0.08] $p < 0.001$). Neither grade, syllabus, experience nor engagement were significant predictors for level of uncertainty intolerance. See Figure 4.1.

Adjusted change in social anxiety. The model testing mean change in the Mini-SPIN revealed significant reductions from baseline to follow-up ($M = -0.54$, 95% CI [-0.90, -0.18], $p =$

0.003). Higher engagement was significantly associated with less social anxiety ($p > .001$), while neither grade, experience, nor syllabus were associated with social anxiety levels. See Figure 4.2.

Adjusted change in social self-efficacy. The model testing change in social self-efficacy revealed a non-significant increase from baseline to follow-up ($M = 0.13$, 95% CI [-0.01, 0.28], $p = .078$). Engagement ($p < .001$) and experience ($p = .038$) were associated with higher social self-efficacy.

Does improvisational theater training predict change in uncertainty intolerance, social anxiety, and social self-efficacy, for those screening positive for social phobia?

First, we tested whether screening positive for social phobia predicted differences in change scores with t -tests. For those screening positive (vs. not) there were greater reductions in the Brief-IUS, ($M = -0.33$ 95% CI [-0.12, -0.53], $p = 0.002$), and social anxiety, ($M = -2.19$ 95% CI [-1.53, -2.85], $p < 0.001$), and no difference in change in social self-efficacy, ($M = 0.14$ 95% CI [-0.15, 0.43], $p = 0.347$). Using Cohen's d , the effect sizes for these changes were 0.40 for the Brief-IUS, 0.83 for the Mini-SPIN, and 0.12 for social self-efficacy (medium, large, small, respectively).

Unadjusted subsample change. From baseline to follow-up, the unadjusted changes showed stronger effect sizes for the mini-SPIN and brief-IUS change scores. For this sample, we found significant decreases in the Brief-IUS ($M = -0.37$ 95% CI [-0.54, -0.21], $p < 0.001$), and the Mini-SPIN ($M = -1.77$, 95%CI [-2.31, -1.23], $p < 0.001$), and a non-significant increase in social self-efficacy ($M = 0.19$, 95% CI [-0.03, 0.42], $p = .094$). Using Cohen's d , the effect sizes for these changes were 0.42 for the Brief-IUS, 0.61 for the Mini-SPIN, and 0.16 for social self-efficacy (medium, large, small, respectively).

Adjusted subsample change in intolerance of uncertainty. The model testing mean change in the Brief-IUS revealed significant reductions from baseline to follow-up ($M = -0.38$, 95% CI [-0.55, -0.21] $p < 0.001$). No co-variates were associated with increases in social self-efficacy.

Adjusted subsample change in social anxiety. The model testing mean change in the Mini-SPIN revealed significant reductions from baseline to follow-up ($M = -1.69$, 95% CI [-2.25, -1.13], $p < 0.001$). More experience was significantly associated with less social anxiety ($p = .028$), while neither grade, engagement, nor syllabus were associated with social anxiety levels.

Adjusted subsample change in social self-efficacy. The model testing change in social self-efficacy revealed a non-significant increase from baseline to follow-up ($M = 0.20$, 95% CI [-0.03, 0.44], $p < .090$). No co-variates were associated with increases in social self-efficacy. See Table 4.3 for a summary of adjusted change estimates.

Does change in uncertainty intolerance explain change in social anxiety?

Correlations. The unadjusted changes in social phobia, uncertainty tolerance, and social self-efficacy were highly correlated with each other at $p < 0.001$. Neither grade nor syllabus predicted changes in any of the outcomes. As Table 4.4 indicates, engagement is also not a significant predictor by itself.

Mixed model for Change. A linear mixed model was constructed for the change in social anxiety, with covariates of syllabus, grade, experience, engagement, baseline social anxiety, change in uncertainty tolerance, and change in social self-efficacy. As we hypothesized, change in uncertainty intolerance did predict change in social anxiety. However, our model also revealed additional predictors. Baseline social anxiety and change in social self-efficacy were also significant predictors of change in social anxiety. While engagement by itself did not predict

change as indicated in the correlation matrix, engagement did predict change in social anxiety after baseline social anxiety was added to the model. See Table 4.5 below.

Agreement statements.

For all four of our post-survey only items, a majority of students ($n = 335$) agreed “very much” or “extremely.” Over 88.2% at least “somewhat” agree with all four statements (see Table 4.6).

Discussion

Prior work has provided evidence that improvisational theater (improv) provides a low stigma, accessible intervention for adolescent social anxiety (Felsman et al., 2018). Given that improv offers repeated exposure to uncertainty in social interactions (e.g., Napier, 2004), and that change in uncertainty intolerance has been shown to predict change in social anxiety (Mahoney & McEvoy, 2012), this study addressed two open empirical questions: 1) whether participating in an improv course predicts change in uncertainty intolerance, and 2) whether that change predicts change in social anxiety. We found evidence to support both of our hypotheses: improv predicts reductions in uncertainty intolerance, and that change in uncertainty intolerance predicts change in social anxiety. This is the first empirical evidence we are aware of to test and support these links.

These findings support the idea that the degree to which people with social phobia can tolerate uncertainty associated with social situations may affect their level of social anxiety (Carleton et al., 2010). They also suggest that improvisational theater may be a non-stigmatizing, accessible method of addressing social anxiety and uncertainty intolerance, offering an alternative to cognitive group behavior therapy (CGBT) protocols targeting social anxiety and uncertainty anxiety related to social situations (e.g., McEvoy, 2007). Importantly, the ability to increase uncertainty tolerance may have broad implications for psychological health because it is

implicated in the development and maintenance of anxiety and depression (e.g., McEvoy & Mahoney, 2012; Carleton et al., 2012).

A secondary purpose of this study was to replicate prior work linking improv participation with social anxiety (Felsman et al., 2018). We found evidence again linking improv training to reductions in social anxiety. In this study, this relationship was more robust, evident in both the subsample of those screening positive for social anxiety as well as the overall sample (which included 104 more paired data points than the previous study).

Interestingly, while engagement did not significantly correlate with change in social anxiety, it did predict change in social anxiety after adjusting for co-variates. With a likelihood ratio test, we find that this occurs after baseline social anxiety is added to the model. So, after adjusting for baseline social anxiety, more engagement predicts greater reductions in social anxiety. A follow-up analysis shows that higher baseline social anxiety is associated with lower self-reported engagement, $r(258) = -.234, p < .001$. So higher baseline anxiety is associated with less engagement; yet screening positive for social phobia (i.e. higher baseline social anxiety) and engagement adjusting for baseline social anxiety are associated with greater reductions in social anxiety. It is possible that there is no unadjusted association between engagement and change in social anxiety because the same group (participants with higher baseline social anxiety) that benefits the most from engaging is likely to engage less.

Another finding worth noting is that, while change in social self-efficacy did not significantly increase over time, the model testing change in social self-efficacy revealed two significant co-variates – engagement and experience, meaning that the more socially confident students reported more engagement and improv experience. We considered the possibility that a prior dose of improv might predict higher baseline social self-efficacy. A post-hoc test of those

who reported having taken a prior improv class ($n = 78$, vs. not; $n = 269$) supported this hypothesis, $t(128.02) = -2.88$, 95% CI [-0.780, 0.145], $p = .005$. Reported prior improv class experience did not predict any other outcome in baseline or change scores. One implication of this is that the gains in social self-efficacy may occur after reductions in anxiety (and thus are not detected immediately following the class, but rather a few weeks later); another is related to a potential sampling bias; namely, that those who end up taking a second improv class are those who are more confident in their social skills. This might work against our ability to detect change in social self-efficacy. A post-hoc paired test of only those reporting that they had not taken a prior improv class supported this hypothesis, $t(185) = -2.03$, 95% CI [-.323, -.004], $p = .044$, showing that for first time improv students, there is an increase in social self-efficacy.

It is also interesting to note that although some schools received a version of *The Improv Project* that used a modified syllabus emphasizing debriefing and life skills, the syllabus did not seem to predict any of the outcome variables. This might suggest that placing extra emphasis on debriefing and life skills does not increase psychological benefits of improv. Alternatively, it is possible that instructors ran these two versions of the course with little substantive differences.

Another interesting finding was that in addition to uncertainty tolerance explaining change in social anxiety, social self-efficacy did so as well. While the current work measured uncertainty intolerance, social anxiety, and social self-efficacy concurrently, future work should test the direction of their relationship by design, including more than two time points.

The sample of urban minority youth participating in this research is important. There is a tremendous service-access gap in youth mental health broadly (Costello et al., 2014), especially among poorer minority youth (Zarger & Rich, 2016), and urban living is associated with anxiety (Hall, Yip, & Zarate, 2016). Detroit public schools are especially in need of resources because of

ongoing financial trouble, poor infrastructure, competition with charter schools, low performance on standardized exams, and chronic absenteeism (Lenhoff, & Pogodzinski, 2018). Recognizing a resource that has been helpful is useful for a growth strategy that builds on strengths.

Because minority youth are historically underrepresented in research, they have been excluded from the development of most evidence-based interventions (Bernal & Scharro-del-Rio, 2001; Hall, Yip, & Zarate, 2016). Although those interventions have been generalized from European Americans to other groups (Hall et al., 2016), studying alternative interventions developed in underrepresented communities offers a wealth of insight for 1) ongoing work within those communities, and 2) its own sake, as potentially valuable insight for other communities or humanity more broadly. We believe that our sample reflects a more inclusive approach to research as has been called for in the past (e.g., Bernal & Scharro-del-Rio, 2001). We also think it is particularly valuable to examine improv with mostly urban minority youth because American improvisational theater (improv) in its early form was developed with mostly urban minority youth (Steitzer, 2011).

Limitations. First, although the pre-post design does track changes over time, a replication with an appropriate control group is needed to rule out confounds such as a placebo effect. Note that in this study, a placebo effect may be less likely to influence reported social anxiety symptoms than in traditional mental health intervention research because this program is offered as an arts education effort.

Second, our analyses included data from 440 total student surveys collected across 14 schools: 350 students pre-survey, 339 post-survey, and 249 paired pre- and post-surveys, such that only 71% of the surveyed students enrolled in the program at week 1 were surveyed at week 10. This 71% retention rate was better than a previous cohort from this population (Felsman et

al., 2018). Importantly, baseline uncertainty tolerance, social anxiety, and social self-efficacy did not predict attrition. Nevertheless, retention remains a limitation on interpreting our analyses.

Conclusion. This study provides the first evidence that participating in an improvisational theater course predicts increased uncertainty tolerance among adolescents from a low income, mostly minority urban population. This is an important contribution to the literature on the usefulness of improvisation training for its benefits to psychological health. For adolescents, improvisational theater training may indirectly provide a low stigma, accessible alternative mental health intervention (Felsman et al., 2018).

Table 4.1. Students surveyed by school and time.

School	Time of day	Week 1	Week 10	Pre & Post	Students Surveyed	Grade Levels
A	Afternoon	18	18	14	22	8 th
B	Afternoon	14	15	8	21	9-12
C	Morning	33	28	23	38	8 th
C2	Afternoon	34	31	30	35	8 th
D	Morning	32	29	26	35	10-12
E	Rotating In-School	31	31	27	35	8 th
F	Morning	15	6	5	16	10-12
G	Morning	5	7	2	10	10-12
H	Afternoon	8	8	8	11	9-12
I	Morning	22	24	18	28	8 th
J	After School	3	4	3	4	10-11
K	Afternoon	21	22	19	24	8 th
L	Afternoon	27	18	18	27	9-12
L2	Afternoon	19	26	9	36	9-12
M	Afternoon	12	7	5	14	12
N	Morning	26	32	19	39	10-12
N2	Afternoon	30	33	18	45	10-12
Total		350	339	249	440	8-12

Table 4.2. Outcomes from an adjusted linear mixed model.^{a,b}

Outcome	Adjusted Mean (95% CI)		
	Baseline	Follow-Up	Change
Intolerance for Uncertainty	2.11 (1.95, 2.27)	1.92 (1.76, 2.09)	-0.19 (-0.30, -0.08)***
Social Anxiety	5.18 (4.43, 5.93)	4.64 (3.89, 5.39)	-0.54 (-0.90, -0.18)**
Social Self-Efficacy	4.41 (4.08, 4.73)	4.54 (4.21, 4.86)	0.13 (-0.01, 0.28)

^aAdjusted for syllabus, grade, experience, and engagement with school and classroom within school included as random clustering effects.

^b*: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$.

Table 4.3. Outcomes of subsample from an adjusted linear mixed model.^{a,b}

Outcome	Adjusted Mean (95% CI)		
	Baseline	Follow-Up	Change
Intolerance for Uncertainty	2.49 (2.31, 2.66)	2.11 (1.93, 2.28)	-0.38 (-0.55, -0.21)***
Social Anxiety	8.31 (7.57, 9.04)	6.61 (5.88, 7.35)	-1.69 (-2.25, -1.13)***
Social Self-Efficacy	3.95 (3.56, 4.34)	4.15 (3.77, 4.54)	0.20 (-0.03, 0.44)

^aAdjusted for syllabus, grade, experience, and engagement with school and classroom within school included as random clustering effects.

^b*: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$.

Table 4.4. Pearson correlation coefficients between changes in outcomes and predictors.

	Social Phobia	Uncertainty Tolerance	Social Self-Efficacy
Social Phobia	1	0.301***	-0.273***
Uncertainty Tolerance	0.301***	1	-0.316***
Social Self-Efficacy	-0.273***	-0.316***	1
Engagement	-0.048	-0.013	-0.005
Experience	0.033	0.036	-0.111
Syllabus	-0.061	-0.074	0.092
Grade	-0.019	-0.040	0.094

^b*: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$ Pearson correlation coefficient.

Table 4.5: Predictors of change in social anxiety from linear mixed model.^{a,b}

Covariate	Mean (95% CI)
Baseline Social Anxiety	-0.38 (-0.47, -0.29)***
Change in Uncertainty Tolerance	0.51 (0.13, 0.89)**
Change in Social Self-Efficacy	-0.53 (-0.80, -0.26)**
Syllabus	0.01 (-0.67, 0.69)
Grade	0.00 (-0.18, 0.19)
Engagement	-0.37 (-0.63, -0.11)**
Experience	-0.14 (-0.43, 0.15)

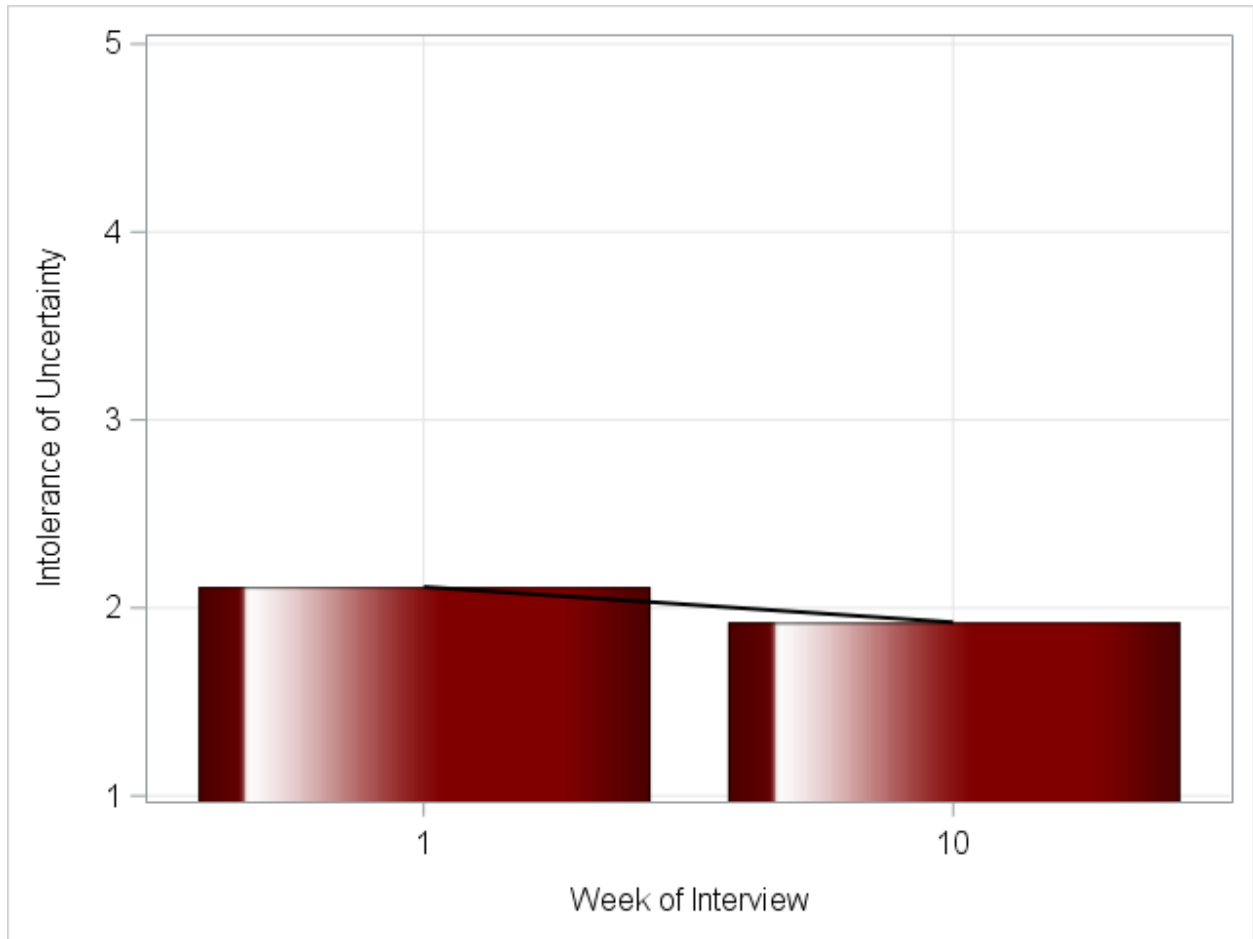
^aSchool and classroom within school included as random clustering effects.

^b*: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$.

Table 4.6. End of class response frequencies.

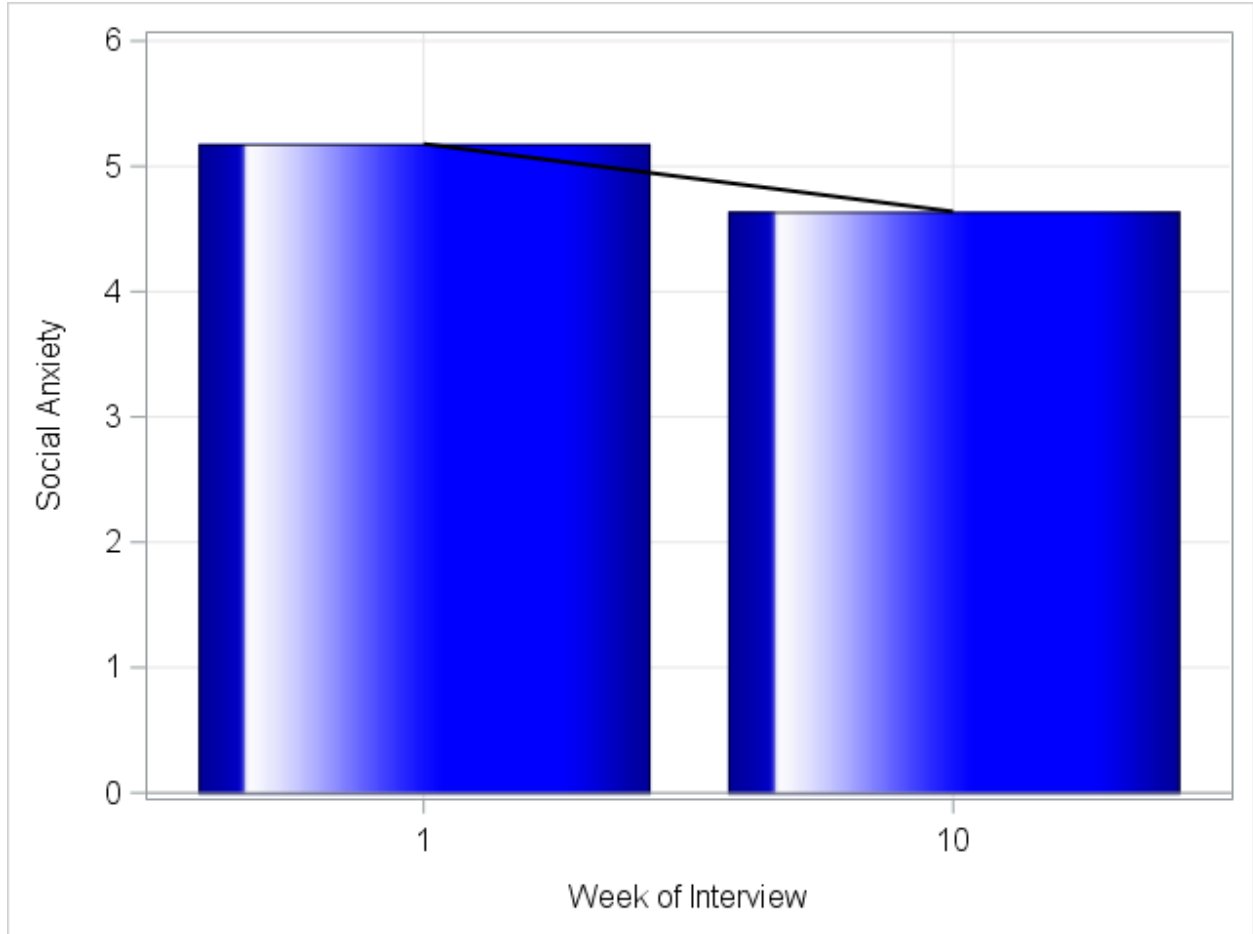
	Extent of agreement					% at least somewhat	% at least Very Much
	Not at all	A little bit	Somewhat	Very Much	Entirely		
I know what “yes and” means.	22	23	47	49	198	86.7%	72.9%
I learned to value teamwork in this class.	15	25	66	84	146	88.1%	68.5%
I can use what I learned in improv in other parts of my life.	20	27	82	75	131	86.0%	61.5%
I was fully engaged in this program when I was in class.	9	51	84	81	113	82.2%	57.4%

Figure 4.1. Adjusted changes in mean uncertainty intolerance over time.^a



^aAdjusted for syllabus, grade, experience, and engagement with school and classroom within school included as random clustering effects.

Figure 4.2. Adjusted changes in mean social anxiety over time.^a



^aAdjusted for syllabus, grade, experience, and engagement with school and classroom within school included as random clustering effects.

Chapter 5: General Discussion

Improvisational theater-specific training has grown exponentially in popularity since the 1960s (Seham, 2001), and celebrity actors and writers (e.g., Tina Fey; Fey, 2013) and business moguls (e.g., Dick Costolo, Twitter CEO; Bilton, 2012), as well as many others (Madson, 2005) have attributed much of their success in life to it.

Despite widespread applications (e.g., “Wellness Program”, n.d.; Tint & Froerer, 2014), the research specifically focusing on improv is broadly emergent (e.g., DeMichele, 2015) and there is almost no experimental basis for its usefulness (e.g., Lewis & Lovatt, 2013). In the domain of mental health, one prior study linked participating in improv with reduced generalized anxiety and depression and increased self-esteem among adult psychiatric patients (Krueger, et al., 2017). There is also some evidence of improv’s usefulness in the domain of creativity (e.g., West et al., 2017; Lewis & Lovatt, 2013).

This dissertation makes three main contributions to the literature. First, in Chapter 2, we show a link between participating in improv and reductions in social anxiety. In Chapter 3, using a randomized experiment, we find evidence that a brief session of improv improves affective well-being, thinking creatively (replicating Lewis & Lovatt, 2013; Sowden et al., 2015), and uncertainty tolerance, which has been implicated broadly in psychological health (e.g., McEvoy, & Mahoney, 2012; Kashdan & Rottenberg, 2010). In Chapter 4, we show in a naturalistic study that participating in a longer, 10-week improv training program predicts significant increases in uncertainty tolerance. Chapter 4 also replicates Chapter 2’s finding linking improv with reductions in social anxiety in both the subsample screening positive for social phobia and the

overall sample (helping rule out the regression to the mean alternate hypothesis). Finally, Chapter 4 finds that change in uncertainty tolerance accounts for a portion of change in social anxiety associated with participation in improv. Chapter 3 has strong internal validity, and Chapters 2 and 4 complement its findings by demonstrating links between improv training and psychological health in a more generalizable, real world improv context.

Taken together, this dissertation provides an early-stage case for the experience of improvising as an alternative therapeutic practice, with one key mechanism of action being its effect on uncertainty tolerance. This is significant because of the need to develop accessible alternative mental health interventions (Felsman et al., 2018). While there may be additional gains conferred through improv by intentionally using it for therapeutic purposes, this dissertation tests only whether improv itself may be therapeutic, in the absence of adjunctive psychoeducation or explicit restructuring. There is a risk that improv training as part of a psychological health intervention may dilute some of its power to target outcomes indirectly.

Given that none of the observed benefits followed explicit mental health didactics, this dissertation supports the idea that exposure to interactions within improv – without explicit restructuring or psychoeducation – can effectively bolster mental health (Hawley et al., 2016). Indeed, improv provides a rich context for exposure to a variety of social experiences that may cause anxiety. Given that uncertainty and social performance are repeatedly encountered in a wide-range of improv contexts and exercises, exposure through improv likely reduces anxiety through inhibitory learning, which benefits from variation (Craske et al., 2008).

An increase in uncertainty tolerance is likely help reduce social anxiety and promote psychological health by increasing approach behaviors (including approaching previously-avoided social performance scenarios). Two major biases that tend to emerge under conditions of

uncertainty anxiety help explain this: 1) we are more likely to attend to threat-related information, and 2) we are more likely to interpret ambiguous stimuli as negative (for review, see Hartley & Phelps, 2012). One study shows that unpredictable (versus predictable) patterns of sound can lead to attentional bias towards negative (versus neutral) expressions, as well as behavioral avoidance (Herry et al., 2007). Taken together, under conditions of uncertainty anxiety, one might feel anxious, direct attention towards potential threats, interpret ambiguous stimuli as negative or threat-related, and pursue safer options (i.e. greater certainty). By increasing uncertainty tolerance through strategies such as doing improvisational theater, people become less susceptible to these biases. Instead of avoiding the experience of uncertainty, they are better able to be present with it.

One consequence of attending to the present appears to be greater life satisfaction (Felsman, Verduyn, Ayduk, & Kross, 2017). Promoting presence in the form of *mindfulness* (“keeping one’s consciousness alive to the present reality”; Hanh, 1976) is a key feature of “third wave” therapies (e.g., Linehan, 1993), and leads to more positive mood states than waitlist or relaxation controls (Davidson et al., 2003; Jain et al., 2007). It may also explain reductions in social anxiety associated with mindfulness and acceptance-based group therapy for social anxiety disorder (Kocovski, Fleming, & Rector, 2009). Presence is also one (if not the most) rewarded state in improv, and it is no surprise that Bermant (2013) proposes improv as a method for increasing mindfulness. To effectively use the “Yes, And” guide, improvisers must learn to practice *mindfulness*: if one cannot directly attend to one’s scene partner, how can they accept and contribute to her idea?

“Unlike a chess player, [the improviser] cannot be thinking several moves ahead—he has to pay attention to that moment. And that moment leads directly to

future moments...An actor following each moment through to the next is constantly making discoveries, an ideal state for improvisers. If a player is planning ahead and thinking about the direction he wants to action to go, then he isn't paying attention to what is going on at the moment. Unfortunately for him and his fellow actors, what is going on at the moment is the scene!" (Halpern et al., 1994, p.71).

Thus, one of the reasons why improv may benefit people with social anxiety – as Chapters 2 and 4 suggest – is through mindfulness-related approach behaviors.

In order for improvisation experience to influence our performance in daily life, transfer must occur. Some researchers claim that transfer is exceedingly rare, and others claim that it is relatively common (Barnett & Ceci, 2002). In their meta-analysis, Hetland and Winner (2004) offer evidence of cognitive transfer from arts to non-arts contexts. Additionally, from a behavioral perspective, transfer seems especially likely to occur from improvisational theatre to daily life because the theatre 1) can act as rehearsal for daily life (Boal, 2013) – as the therapist's office acts as rehearsal for daily life during role-plays in CBT (Beck & Haigh, 2014); and 2) it acts as a context that reinforces fully, attentively, mindfully *living*.

Viola Spolin argues that to create reality on stage, her improv students must “perceive and be open to receive the phenomenal world...;” consequently, “...*experiencing* is the only actual homework...” (Spolin, 1983, p.15). An improviser who collects experiences in the world *mindfully* is better able to portray them on stage. On one level, an improviser who is aware of how their body interacts with everyday objects (e.g., an egg, a pan, a spatula) can convincingly show the audience what they are doing (e.g., frying an egg) in the absence of real objects; on another level, an improviser who expands their set of knowledge or experience (e.g., learns how

to fly a plane or how to file for divorce) can more richly represent characters they are cast as in the moment (e.g., a pilot going through a divorce).

Importantly, we do see evidence that participating in improv improves outcomes in non-improv contexts. For youth, for example, the measure of social anxiety we used in Chapters 2 and 3 is widely used to detect social anxiety disorder in non-improv contexts.

Implications. This dissertation supports the claim that improv itself, in the absence of adjunctive psychoeducation or explicit restructuring, may be therapeutic. One way it may be therapeutic is by increasing uncertainty tolerance through exposure (because improv is intentionally uncertain) (e.g., Napier, 2004). Traditional exposures, which are often “well planned” (Abramowitz, Deacon, & Whiteside, 2011, p. 122) so as to target fears with specific levels of intensity, may miss the opportunity to target uncertainty tolerance. Worse, exposure therapies may inadvertently reinforce uncertainty intolerance by showing patients that a good way to approach a feared experience is to reduce uncertainty about it (e.g., repetitively practicing a speech until it is known verbatim). This is a valid but perhaps less durable strategy because some experiences are impossible to plan for and even the best plans may go awry. Therapists might incorporate lessons from this dissertation into their exposure plans by deliberately manipulating the extent of planning prior to exposure so as to help their patients encounter uncertainty and build tolerance towards it, or as in improv, even find joy in it.

There is a risk that improv interventions with an explicit focus on mental health (not as an indirect intervention as we tested it) have a different impact on outcomes; however, such programs do exist (e.g., see Second City’s “Wellness Program,” n.d.). Our research suggests such targeted mental health programs be compared to “improv as usual” for effectiveness. To do

so, an integrated intervention should be carefully developed with a team of improv and mental health experts and tested for efficacy.

It is likely that improv curricula can be enhanced by more evidence-based mental health content, and vice versa. Logistically, this may pair the structure of a typical improv class – with both experiential and reflective components – with exposure and cognitive restructuring steps in cognitive behavioral therapy (CBT) (Felsman et al., 2018). One way instructors might incorporate CBT into the experiential part of the class would be to challenge participants to deliberately try behaviors to test out dysfunctional thoughts. For example, if an improviser in the class believes, “I look stupid when I dance,” and that keeps them from dancing, the instructor might encourage them to play a dancer in a scene who dances especially strange. The improviser might even use the Subjective Units of Distress Scale (SUDS) (Wolpe & Lazarus, 1967) to record how they feel before, during, and after the scene. Periods of reflection can be used to notice whether expectations were met or not, to notice patterns of behavior that might be keeping one from meeting their goals outside of the theater, and to consider new information (e.g., feedback from peers).

Strength of sample. The sample participating in the research reported in Chapters 2 and 4 were of urban minority youth (grades 8-12). Because minority youth are historically underrepresented in research, they have been excluded from the development of most evidence-based interventions (Bernal & Scharro-del-Rio, 2001; Hall, Yip, & Zarate, 2016). Studying alternative interventions developed in underrepresented communities offers a wealth of insight for 1) ongoing work with those communities; and 2) work in other communities or humanity more broadly.

We believe that our sample reflects a more inclusive approach to research as has been called for in the past (e.g., Bernal & Scharro-del-Rio, 2001). We also think it is particularly valuable to examine improv with mostly urban minority youth because American improvisational theater was first developed with this population (Steitzer, 2011).

We also believe our sample has value because there is a tremendous service-access gap in youth mental health broadly (Costello et al., 2014), especially among poorer minority youth (Zarger & Rich, 2016); further, urban living is associated with anxiety (Hall, Yip, & Zarate, 2016). Detroit public schools are especially in need of resources because of ongoing financial trouble, poor infrastructure, competition with charter schools, low performance on standardized exams, and chronic absenteeism (Lenhoff, & Pogodzinski, 2018). Recognizing a resource that has been shown to be helpful is useful as a growth strategy that builds on strengths.

Limitations and future directions. The laboratory-based studies in Chapter 3 of this dissertation highlighted some interesting questions about improv and its benefits. First, given that other brief social interactions have been shown to increase positive feelings, satisfaction and sense of belonging (Sandstrom & Dunn, 2014a), it is important when evaluating the specific effects of improv to have a control condition to rule out alternative explanations (Cook et al., 2002). Second, more work is needed to test which features of improv drive which effects and whether certain features in combination result in effects. For example, our Chapter 3's Experiment 2 confounded the improv feature of unpredictability with its feature of engaging creativity. Because some everyday interactions can be more or less like improv, (e.g., friends "riffing," vs. ordering in a restaurant; Bower, Black, & Turner, 1979; Sawyer & Sawyer, 2003), future work might set up multiple interaction control conditions to test the effects of more specific features of improv experience.

One of the strengths of this dissertation is that it includes studies with relatively large samples, both true experiments and field studies, and samples with underserved urban youth and highly educated, young adult university undergraduates. Nevertheless, future work should replicate these effects in different samples; of particular interest, samples of people for whom improv is already being applied in practice (e.g., youth with Autism Spectrum Disorder (ASD) and the elderly with and without dementia).

Concluding comment. Improvisational theater may very well offer wisdom about how to live in a social world (e.g., Madson, 2005) learned experientially through exercises, practice, and reflection (e.g., Spolin, 1983). Although used as a part of psychological health interventions since at least Jacob Moreno's psychodrama in the 1920s (Kedem-Tahar, & Felix-Kellermann, 1996), experience with improv training may function well on its own as a low cost, non-stigmatizing psychological health intervention with broad effects.

References

- Abramowitz, J. S., Deacon, B. J., & Whiteside, S. P. (2011). *Exposure therapy for anxiety: Principles and practice*. New York: Guilford Publications.
- Albano, A. M. (1996). Treatment of social anxiety in adolescents. *Cognitive and Behavioral Practice, 2*(2), 271-298.
- Allison, P. (2002). *Missing data*. Sage Publications, University of Iowa, Iowa City, IA.
- Akaike, H. (1974). A New Look at the Statistical Model Identification. *IEEE Transactions on Automatic Control, AC-19*, 716–723.
- Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. *Journal of personality and social psychology, 43*(5), 997.
- American Psychiatric Association. (2013). Anxiety disorders. In *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
<https://doi.org/10.1176/appi.books.9780890425596.dsm05>
- Argyle, M. (2013). *The social psychology of everyday life*. Routledge.
- Aronson, E., Carlsmith, J. M., & Ellsworth, P. C. (1990). *Methods of research in social psychology* (2nd ed.). New York: McGraw-Hill.
- Asher, M., Asnaani, A., & Aderka, I. M. (2017). Gender differences in social anxiety disorder: A review. *Clinical Psychology Review, 56*, 1-12.
- Baer, J., Kaufman, J. C., & Riggs, M. (2009). Brief report: Rater-domain interactions in the consensual assessment technique. *The International Journal of Creativity & Problem Solving, 19*(2), 87-92.

- Berk, R. A., & Trieber, R. H. (2009). Whose classroom is it, anyway? Improvisation as a teaching tool. *Journal on Excellence in College Teaching*, 20(3), 29-60.
- Bermant, G. (2013). Working with (out) a net: Improvisational theater and enhanced well-being. *Frontiers in Psychology*, 4, 1929.
- Bandelow, B., & Michaelis, S. (2015). Epidemiology of anxiety disorders in the 21st century. *Dialogues in Clinical Neuroscience*, 17(3), 327.
- Bardi, A., Guerra, V. M., Sharadeh, G., & Ramdeny, D. (2009). Openness and ambiguity intolerance: Their differential relations to well-being in the context of an academic life transition. *Personality and Individual Differences*, 47, 219-223.
- Bernal, G., & Scharró-del-Río, M. R. (2001). Are empirically supported treatments valid for ethnic minorities? Toward an alternative approach for treatment research. *Cultural Diversity and Ethnic Minority Psychology*, 7(4), 328.
- Besser, M., Roberts, I., Walsh, M., Wengert, J. (2013). *The Upright Citizens Brigade Comedy Improvisation Manual*. New York: Comedy Council of Nicea.
- Bickhard, M. H. (1989). The nature of psychopathology. *International psychotherapy: Theories, research, and cross-cultural implications*, 115-140.
- Bilton, N. (2012). A master of improv, writing Twitter's script. *The New York Times*. Retrieved from <http://www.nytimes.com/2012/10/07/technology/dick-costolo-of-twitter-an-improv-master-writing-its-script.html>.
- Boelen, P. A., & Reijntjes, A. (2009). Intolerance of uncertainty and social anxiety. *Journal of anxiety disorders*, 23(1), 130-135.
- Bohner, G. & Dickel, N. (2011). Attitudes and attitude change. *Annual Review of Psychology*, 62, 391-417. 10.1146/annurev.psych.121208.131609.

- Brozovich, F. A., Goldin, P., Lee, I., Jazaieri, H., Heimberg, R. G., & Gross, J. J. (2015). The effect of rumination and reappraisal on social anxiety symptoms during cognitive-behavioral therapy for social anxiety disorder. *Journal of Clinical Psychology, 71*(3), 208-218.
- Buhr, K., & Dugas, M. J. (2006). Investigating the construct validity of intolerance of uncertainty and its unique relationship with worry. *Journal of Anxiety Disorders, 20*(2), 222-236.
- Bujacz, A., Dunne, S., Fink, D., Gatej, A. R., Karlsson, E., Ruberti, V., & Wronska, M. K. (2016). Why do we enjoy creative tasks? Results from a multigroup randomized controlled study. *Thinking Skills and Creativity, 19*, 188-197.
- Burwell, R. A., & Shirk, S. R. (2007). Subtypes of rumination in adolescence: Associations between brooding, reflection, depressive symptoms, and coping. *Journal of Clinical Child and Adolescent Psychology, 36*(1), 56-65.
- Butler, J. D. (2017). The complex intersection of education and therapy in the drama therapy classroom. *The Arts in Psychotherapy, 53*, 28-35.
- Butler, J. D., & Gaines, A. M. (2016). The history, trends and future of North American drama therapy. In *Routledge International Handbook of Dramatherapy* (pp. 74-86). Routledge.
- Carleton, R. N. (2012). The intolerance of uncertainty construct in the context of anxiety disorders: Theoretical and practical perspectives. *Expert Review of Neurotherapeutics, 12*(8), 937-947.
- Carleton, R. N., Mulvogue, M. K., Thibodeau, M. A., McCabe, R. E., Antony, M. M., & Asmundson, G. J. (2012). Increasingly certain about uncertainty: Intolerance of uncertainty across anxiety and depression. *Journal of Anxiety Disorders, 26*(3), 468-479.

- Carr, M., & Borkowski, J. G. (1987). Metamemory in gifted children. *Gifted Child Quarterly*, 31(1), 40.
- Chandra, A., & Minkovitz, C. S. (2006). Stigma starts early: Gender differences in teen willingness to use mental health services. *Journal of Adolescent Health*, 38, 754.e1–754.e8
- Cicchetti, D. V. (1994). "Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology". *Psychological Assessment*. 6 (4): 284–290. doi:10.1037/1040-3590.6.4.284
- Clark, D. A., & Beck, A. T. (1999). *Scientific foundations of cognitive theory and therapy of depression*: John Wiley & Sons.
- Cohen, I. J. (2015). *Solitary Action: Acting on Our Own in Everyday Life*. Oxford University Press.
- Coles, M. E., Ravid, A., Gibb, B., George-Denn, D., Bronstein, L. R., & McLeod, S. (2016). Adolescent mental health literacy: young people's knowledge of depression and social anxiety disorder. *Journal of Adolescent Health*, 58(1), 57-62.
- Connolly, J. (1989). Social self-efficacy in adolescence: Relations with self-concept, social adjustment, and mental health. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 21(3), 258.
- Connor, K. M., Kobak, K. A., Churchill, L. E., Katzelnick, D., & Davidson, J. R. (2001). Mini-SPIN: A brief screening assessment for generalized social anxiety disorder. *Depression and Anxiety*, 14(2), 137-140.
- Cook, T. D., Campbell, D. T., & Shadish, W. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin.

- Corsaro, W. A., & Eder, D. (1990). Children's peer cultures. *Annual Review of Sociology*, 197-220.
- Costello, E. J., He, J. P., Sampson, N. A., Kessler, R. C., & Merikangas, K. R. (2014). Services for adolescents with psychiatric disorders: 12-month data from the National Comorbidity Survey–Adolescent. *Psychiatric Services*, 65(3), 359-366.
- Craske, M. G. (2012). Transdiagnostic treatment for anxiety and depression. *Depression and Anxiety*, 29(9), 749-753.
- Craske, M. G., Kircanski, K., Zelikowsky, M., Mystkowski, J., Chowdhury, N., & Baker, A. (2008). Optimizing inhibitory learning during exposure therapy. *Behaviour Research and Therapy*, 46(1), 5-27.
- Creative Problem Solving Institute (May 26, 2019). Ret. From <http://www.creativeeducationfoundation.org/programs-workshops/creativity-training-cpsi-conference/>
- Crockett, L., Losoff, M., & Petersen, A. C. (1984). Perceptions of the peer group and friendship in early adolescence. *The Journal of Early Adolescence*, 4(2), 155-181.
- Cropley, A. (2006). In praise of convergent thinking. *Creativity Research Journal*, 18, 391–404.
- Dalbert, C. (1996). Uncertainty Tolerance Scale [Database record]. Retrieved from PsychTESTS.
- DeMichele, M. (2015). Improv and ink: Increasing individual writing fluency with collaborative improv. *International Journal of Education & the Arts*, 16(10), 1-25.
- Detle, D., & Dalbert, C. (2005). Moving for their first job or staying put? Predictors of high school students' attitudes towards geographic mobility. *Journal of Applied Social Psychology*, 35, 1719-1737.

- Diggle P.J., Heagerty P., Liang K., Zeger S.L. (2002). *Analysis of longitudinal data*. 2nd ed. New York, NY: Oxford University Press.
- Dokter, D., & Winn, L. (2010). Evaluating dramatherapy. EBP and PBE: A research project. *Dramatherapy*, 31(1), 3-9.
- Dugas, M. J., & Ladouceur, R. (2000). Treatment of GAD: Targeting intolerance of uncertainty in two types of worry. *Behavior Modification*, 24(5), 635-657.
- Dugas, M. J., Ladouceur, R., Leger, E., Freeston, M. H., Langolis, F., Provencher, M. D., & Boisvert, J. M. (2003). Group cognitive-behavioral therapy for generalized anxiety disorder: treatment outcome and long-term follow-up. *Journal of Consulting and Clinical Psychology*, 71(4), 821.
- Dumas, D., & Dunbar, K. N. (2014). Understanding fluency and originality: A latent variable perspective. *Thinking Skills and Creativity*, 14, 56-67.
- Dunphy, K., Mullane, S., & Jacobsson, M. (2013). The effectiveness of expressive arts therapies: A review of the literature. *Melbourne: PACFA*.
- Eisinga, R., Te Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown?. *International journal of public health*, 58(4), 637-642.
- Emunah, R. (1994). *Acting for real: Drama therapy process. Technique, and Performance*. New York: Brunner-Routledge.
- Felsman, P., Seifert, C. M., & Himle, J. A. (2018). Reducing social anxiety in adolescents with improvisational theater training. *The Arts in Psychotherapy*.
<https://doi.org/10.1016/j.aip.2018.12.001>
- Felsman, P., Verduyn, P., Ayduk, O., & Kross, E. (2017). Being present: Focusing on the present predicts improvements in life satisfaction but not happiness. *Emotion*, 17(7), 1047.

- Fernández-Aguayo, S., & Pino-Juste, M. (2018). Drama therapy and theater as an intervention tool: Bibliometric analysis of programs based on drama therapy and theater. *The Arts in Psychotherapy, 59*, 83-93.
- Fey, T. (2013). *Bossypants*. New York: Reagan Arthur.
- Fialko, L., Bolton, D., & Perrin, S. (2012). Applicability of a cognitive model of worry to children and adolescents. *Behaviour research and therapy, 50*(5), 341-349.
- Fotis, M. (2014). *Long form improvisation and American comedy: The Harold*. Springer.
- Gibson, J. J. (2014). *The ecological approach to visual perception: classic edition*. New York: Psychology Press.
- Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.
- Grillon, C., Baas, J. P., Lissek, S., Smith, K., & Milstein, J. (2004). Anxious responses to predictable and unpredictable aversive events. *Behavioral neuroscience, 118*(5), 916.
- Hadida, A. L., Tarvainen, W., & Rose, J. (2015). Organizational improvisation: A consolidating review and framework. *International Journal of Management Reviews, 17*(4), 437-459.
- Hainselin, M., Aubry, A., & Bourdin, B. (2018). Improving teenagers' divergent thinking with improvisational theater. *Frontiers in Psychology, 9*.
- Hall, G. C. N., Yip, T., & Zárata, M. A. (2016). On becoming multicultural in a monocultural research world: A conceptual approach to studying ethnocultural diversity. *American Psychologist, 71*(1), 40.
- Halpern, C., Close, D., Johnson, K. (1994). *Truth in comedy: The manual of improvisation*: Meriwether Pub.
- Harvey, A. G., & Gumport, N. B. (2015). Evidence-based psychological treatments for mental

- disorders: Modifiable barriers to access and possible solutions. *Behaviour Research and Therapy*, 68, 1-12.
- Hawley, L. L., Rector, N. A., & Laposa, J. M. (2016). Examining the dynamic relationships between exposure tasks and cognitive restructuring in CBT for SAD: Outcomes and moderating influences. *Journal of Anxiety Disorders*, 39, 10-20.
- Hayes, S. (2004). Acceptance and Commitment Therapy, Relational Frame Theory, and the third wave of behavior therapy. *Behavior Therapy*, 35(4), 639 - 665.
- Hayes, S., Luoma, J., Bond, F., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: model, processes and outcomes. *Behavior Research Therapy*, 44(1), 1 - 25.
- Hayes, S. C., Villatte, M., Levin, M., & Hildebrandt, M. (2011). Open, aware, and active: Contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology*, 7, 141-168.
- Herry, C., Bach, D. R., Esposito, F., Di Salle, F., Perrig, W. J., Scheffler, K., . . . Seifritz, E. (2007). Processing of temporal unpredictability in human and animal amygdala. *The Journal of Neuroscience*, 27(22), 5958-5966.
- Hirsh, J. B., Mar, R. A., & Peterson, J. B. (2012). Psychological entropy: a framework for understanding uncertainty-related anxiety. *Psychological Review*, 119(2), 304.
- Hofmann, S. G., Sawyer, A. T., & Fang, A. (2010). The empirical status of the “new wave” of cognitive behavioral therapy. *Psychiatric Clinics of North America*, 33(3), 701-710.
- Jagodowski, T., Pasquesi, D., & Victor, P. (2015). *Improvisation at the speed of life: The TJ and Dave book*. Chicago: Solo Roma: Inc.
- James, A. C., James, G., Cowdrey, F. A., Soler, A., & Choke, A. (2015). Cognitive behavioural

- therapy for anxiety disorders in children and adolescents. In *Cochrane Database of Systematic Reviews*. DOI: 10.1002/14651858.CD004690.pub4.
- Jarosz, A. F., Gregory, J. H., & Wiley, J. (2012). Uncorking the muse: Alcohol intoxication facilitates creative problem solving. *Consciousness and Cognition*, 21(1), 487-493.
- Johnstone, K. (1999). *Impro for Storytellers. Theatresports and the Art of Making Things Happen*, London: Faber and Faber.
- Kaufman, J. C., & Baer, J. (2012). Beyond new and appropriate: Who decides what is creative?. *Creativity Research Journal*, 24(1), 83-91.
- Kaufman, J. C., Plucker, J. A., & Baer, J. (2008). *Essentials of creativity assessment* (Vol. 53). John Wiley & Sons.
- Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review*, 30(7), 865-878.
- Kedem-Tahar, E., & Felix-Kellermann, P. (1996). Psychodrama and drama therapy: A comparison. *The Arts in Psychotherapy*, 23 (1), 27-36.
- Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62(6), 617-627.
- Knappe, S., Sasagawa, S., & Creswell, C. (2015). Developmental epidemiology of social anxiety and social phobia in adolescents. In *Social anxiety and phobia in adolescents* (pp. 39-70). Springer, Cham.
- Kocovski, N. L., Fleming, J. E., & Rector, N. A. (2009). Mindfulness and acceptance-based group therapy for social anxiety disorder: An open trial. *Cognitive and Behavioral Practice*, 16(3), 276-289.

- Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., ... & Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PloS one*, 8(8), e69841.
- Krueger, K. R., Murphy, J. W., & Bink, A. B. (2017). Thera-prov: a pilot study of improv used to treat anxiety and depression. *Journal of Mental Health*, 1-6.
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159-174.
- Lavik, K. O., Veseth, M., Frøysa, H., Binder, P. E., & Moltu, C. (2018). Nobody else can lead your life': What adolescents need from psychotherapists in change processes. *Counselling and Psychotherapy Research*, 18(3), 262-273.
- Leary, M. R., & Jongman-Sereno, K. P. (2014). Social anxiety as an early warning system: A refinement and extension of the self-presentation theory of social anxiety. In *Social Anxiety (Third Edition)* (pp. 579-597).
- Lee, C. S., Therriault, D. J., & Linderholm, T. (2012). On the cognitive benefits of cultural experience: Exploring the relationship between studying abroad and creative thinking. *Applied Cognitive Psychology*, 26(5), 768-778.
- Lenhoff, S. W., & Pogodzinski, B. (2018). School organizational effectiveness and chronic absenteeism: Implications for accountability. *Journal of Education for Students Placed at Risk (JESPAR)*, 23(1-2), 153-169.
- Lewis, C., & Lovatt, P. J. (2013). Breaking away from set patterns of thinking: Improvisation and divergent thinking. *Thinking Skills and Creativity*, 9, 46-58.
- Li, Y., & Wright, M. F. (2014). Adolescents' social status goals: Relationships to social status

- insecurity, aggression, and prosocial behavior. *Journal of youth and adolescence*, 43(1), 146-160.
- Lubart, T. (2016). Creativity and convergent thinking: Reflections, connections and practical considerations. *Bulletin of Peoples' Friendship University of Russia, Series Psychology and Pedagogy*, 4, 7–15.
- Lucas, B. J., & Nordgren, L. F. (2015). People underestimate the value of persistence for creative performance. *Journal of Personality and Social Psychology*, 109(2), 232.
- Lynch, T. R., Chapman, A. L., Rosenthal, M. Z., Kuo, J. R., & Linehan, M. M. (2006). Mechanisms of change in dialectical behavior therapy: Theoretical and empirical observations. *Journal of Clinical Psychology*, 62(4), 459-480.
- Madson, P. (2005). *Improv wisdom*. New York, Bell Tower.
- Mahoney, A. E., & McEvoy, P. M. (2012). Changes in intolerance of uncertainty during cognitive behavior group therapy for social phobia. *Journal of behavior therapy and experimental psychiatry*, 43(2), 849-854.
- McEvoy, P. M., & Mahoney, A. E. (2012). To be sure, to be sure: Intolerance of uncertainty mediates symptoms of various anxiety disorders and depression. *Behavior Therapy*, 43(3), 533-545.
- McNair, D. M., & Heuchert, J. W. P. (2003). POMS: Profile of Mood States: Technical update.
- Mourey, J. A. (2019). Improv comedy and modern marketing education: Exploring consequences for divergent thinking, self-efficacy, and collaboration. *Journal of Marketing Education*, 0273475318822087.
- Napier, M. (2004). *Improvise: Scene from the inside out*. United Kingdom: Heinemann Drama.
- Norton, P. J., & Price, E. C. (2007). A meta-analytic review of adult cognitive-behavioral

- treatment outcome across the anxiety disorders. *The Journal of Nervous and Mental Disease*, 195(6), 521-531.
- Olfson, M., Guardino, M., Struening, E., Schneier, F. R., Hellman, F., & Klein, D. F. (2000). Barriers to the treatment of social anxiety. *American Journal of Psychiatry*, 157(4), 521-527.
- Otto, K., & Dalbert, C. (2010). New challenges for human resource management: Readiness to perform a mobile job and its antecedents. *The International Journal of Human Resource Management*, 21(4), 600-614.
- Otto, K., & Dalbert, C. (2012). Individual differences in job-related relocation readiness: The impact of personality dispositions and social orientations. *Career Development International*, 17(2), 168-186.
- Otto, K., Dette-Hagenmeyer, D., & Dalbert, C. (2004). Occupational mobility in members of the labor force: Explaining the willingness to change occupations. *Journal of Career Development*, 36(3), 262-288.
- Patel, A., Knapp, M., Henderson, J., & Baldwin, D. (2002). The economic consequences of social phobia. *Journal of Affective Disorders*, 68(2), 221-233.
- Peterson, J. B. (1999). *Maps of meaning: The architecture of belief*. New York: Psychology Press.
- Peterson, J. B., & Flanders, J. L. (2002). Complexity management theory: Motivation for ideological rigidity and social conflict. *Cortex*, 38(3), 429-458.
- Phillips Sheesley, A., Pfeffer, M., & Barish, B. (2016). Comedic improv therapy for the treatment of social anxiety disorder. *Journal of Creativity in Mental Health*, 11(2), 157-169.

- Powers, M. B., Sigmarsson, S. R., & Emmelkamp, P. M. (2008). A meta-analytic review of psychological treatments for social anxiety disorder. *International Journal of Cognitive Therapy, 1*(2), 94-113.
- Professional Development. (n.d.). Retrieved from <https://www.seconcity.com/courses/chicago/professional-development/>
- Ranta, K., Kaltiala-Heino, R., Rantanen, P., & Marttunen, M. (2012). The Mini-Social Phobia Inventory: Psychometric properties in an adolescent general population sample. *Comprehensive Psychiatry, 53*(5), 630-637.
- Runco, M. A. (2017). Comments on where the creativity research has been and where is it going. *The Journal of Creative Behavior, 51*(4), 308-313.
- Runco, M.A., & Jaeger, G. (2012). The standard definition of creativity. *Creativity Research Journal, 24*, 92–96.
- Sandstrom, G. M., & Dunn, E. W. (2014a). Is efficiency overrated? Minimal social interactions lead to belonging and positive affect. *Social Psychological and Personality Science, 5*(4), 437-442.
- Sandstrom, G. M., & Dunn, E. W. (2014b). Social interactions and well-being: The surprising power of weak ties. *Personality and Social Psychology Bulletin, 40*(7), 910-922.
- SAS Institute. The MIXED procedure. Cary, NC: SAS Institute; 2019.
- Sawyer, R. K., & Sawyer, R. K. (2003). *Improvised dialogues: Emergence and creativity in conversation*. Greenwood Publishing Group.
- Schneier, F. R., Bruce, L. C., & Heimberg, R. G. (2014). Social anxiety disorder (Social Phobia). *Gabbard's treatments of psychiatric disorders* (Fifth ed.). Arlington, VA: American Psychiatric Publishing.

- Schwarz, G. (1978). "Estimating the dimension of a model." *Annals of Statistics*, 6, 461–464.
- Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity research journal*, 16(4), 361-388.
- Seham, A. E. (2001). *Whose improv is it anyway? Beyond Second City*. Univ. Press of Mississippi.
- Simonton, D. K. (2012). Teaching creativity: Current findings, trends, and controversies in the psychology of creativity. *Teaching of Psychology*, 39(3), 217-222.
- Snyder, C. R., Hoza, B., Pelham, W. E., Rapoff, M., Ware, L., Danovsky, M., ... & Stahl, K. J. (1997). The development and validation of the Children's Hope Scale. *Journal of Pediatric Psychology*, 22(3), 399-421.
- Sowden, P. T., Clements, L., Redlich, C., & Lewis, C. (2015). Improvisation facilitates divergent thinking and creativity: Realizing a benefit of primary school arts education. *Psychology of Aesthetics, Creativity, and the Arts*, 9(2), 128.
- Spolin, V. (1983). *Improvisation for the theater: A handbook of teaching and directing techniques* (2nd ed.). Evanston, IL: Northwestern University Press.
- Steitzer, C. (2011). The brilliant genius: Using improv comedy in social work groups. *Social Work With Groups*, 34(3-4), 270-282.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education*, 2, 53.
- Tint, B., & Froerer, A. (2014). Delphi study summary. *Applied Improvisation Network*. Retrieved from <http://appliedimprovisation.network/wp-content/uploads/2015/11/Delphi-Study-Summary.pdf>
- Walton, A. P. (2003). The impact of interpersonal factors on creativity. *International Journal of*

Entrepreneurial Behavior & Research, 9(4), 146-162.

Wellness. (n.d.). Retrieved from

<https://www.seconddcity.com/courses/chicago/wellness-program/>

West, S., Hoff, E., & Carlsson, I. (2017). Enhancing team creativity with playful improvisation theater: a controlled intervention field study. *International Journal of Play*, 6(3), 283-293.

West B.T., Welch K.B., Galecki A.T. (2014). *Linear mixed models: A practical guide to using statistical software*. 2nd ed. Boca Raton, FL: Chapman & Hall.

Wiener, D. (1994). *Rehearsals for growth*. New York: Norton.

Williams, L. K., & McGuire, S. J. (2010). Economic creativity and innovation implementation: the entrepreneurial drivers of growth? Evidence from 63 countries. *Small Business Economics*, 34(4), 391-412.

Wolitzky-Taylor, K., Zimmermann, M., Arch, J. J., De Guzman, E., & Lagomasino, I. (2015). Has evidence-based psychosocial treatment for anxiety disorders permeated usual care in community mental health settings?. *Behaviour Research and Therapy*, 72, 9-17.

Wolpe, J. and Lazarus, A. A. (1967). *Behavior Therapy Techniques: a guide to the treatment of neuroses*. New York: Pergamon Press.

Yapko, M. D. (2010). Hypnotic intervention for ambiguity as a depressive risk factor. *Australian Journal of Clinical Hypnotherapy & Hypnosis*, 31(1).

Yuen, E. K., Herbert, J. D., Forman, E. M., Goetter, E. M., Comer, R., & Bradley, J. C. (2013). Treatment of social anxiety disorder using online virtual environments in second life. *Behavior Therapy*, 44(1), 51-61.

Zarger, M. M., & Rich, B. A. (2016). Predictors of treatment utilization among adolescents with

social anxiety disorder. *Children and Youth Services Review*, 71, 191-198.