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Self-Help for Social Anxiety: Randomized Controlled Trial Comparing a Mindfulness and Acceptance-Based Approach With a Control Group

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There are many barriers to the delivery of evidence-based treatment, including geographical location, cost, and stigma. Self-help may address some of these factors but there is a paucity of research on the efficacy of self-help for many problems, including social anxiety. The present research evaluated the efficacy of a mindfulness and acceptance-based self-help approach for the treatment of social anxiety. Individuals seeking help for social anxiety or shyness were recruited from the community. Participants (*N* = 117) were randomly assigned to a book (*n* = 58) or wait-list control condition (*n* = 59) on a 1:1 ratio. Hierarchical linear modelling results supported the efficacy of the self-help condition with between-group effect sizes on social anxiety outcomes ranging from .74 to .79. Significant change was also observed on self-compassion, mindfulness, acceptance, and depression. Some variables, including social anxiety and acceptance, were assessed weekly for those in the book condition. Additional participants (*n* = 35) were recruited for the book condition increasing the sample size to 93 for the latent change score modelling analyses. A unidirectional model was supported: increases in acceptance were associated with subsequent decreases in social anxiety. Overall these results support the use of a mindfulness and acceptance-based self-help approach for social anxiety.

Keywords: social anxiety; self-help; mindfulness; acceptance and commitment therapy

SOCIAL ANXIETY DISORDER (SAD) is characterized by a persistent fear of one or more social situations that involve the possibility of being negatively evaluated by others. Given the nature of the disorder, individuals with SAD may feel uncomfortable seeking help in traditional therapy settings. There are also other barriers to the treatment of SAD, including a lack of availability of empirically supported approaches in a particular geographical location, stigma associated with seeking treatment, and the cost of psychological services in many

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areas. Given that self-help approaches are low-cost and can be accessed from almost any location in a discrete manner, many of these barriers can be addressed. To our knowledge, cognitive behavioral therapy (CBT) is the only empirically supported strategy for social anxiety that has been examined in a self-help book format. Abramowitz, Moore, Braddock, and Harrington (2009) investigated the efficacy of Antony and Swinson's (2000) traditional CBT self-help book for social anxiety and shyness. The intervention was based on an 8-week CBT protocol for individuals with social anxiety and included minimal therapist contact. Abramowitz et al. found support for reductions in social anxiety and increases in quality of life compared to those assigned to the wait-list control condition.

In addition to traditional CBT, there is empirical support for the use of Acceptance and Commitment Therapy (ACT) for social anxiety from open trials (Dalrymple & Herbert, 2007; Kocovski, Fleming, & Rector, 2009) and more recent randomized controlled trials (RCTs) in which ACT was compared with traditional CBT (Craske et al., 2014; Kocovski, Fleming, Hawley, Huta, & Antony, 2013). In both RCTs, ACT and traditional CBT were found to lead to similar improvements in social anxiety and positive mental health outcomes. The utility of mindfulness and acceptance-based self-help books has been examined in relation to anxiety more broadly or other difficulties such as depression. Forsyth and Eifert's (2007) ACT self-help book for anxiety was evaluated in an RCT (Ritzert et al., 2016). Compared to a control condition, those assigned to the book condition experienced significant reductions in anxiety and depression and increases in quality of life, mindfulness, and self-compassion. These gains were maintained at 12 weeks, 6 months, and 9 months following the completion of the book. Additionally, Williams, Teasdale, Segal, and Kabat-Zinn's (2007) self-help book following a mindfulness-based cognitive therapy protocol for depression has been examined in a student sample (Lever Taylor, Strauss, Cavanagh, & Jones, 2014). There was support for decreases in depression and anxiety and increases in mindfulness and self-compassion, compared to the wait-list control condition. Given these findings, mindfulness and ACT-based approaches delivered in a self-help book format appear helpful for anxiety and depression. However, it has yet to be examined whether a mindfulness and acceptance-based self-help book would be effective for social anxiety specifically.

Others have investigated the usefulness of Internet-delivered therapies for social anxiety. For instance, Hedman et al. (2011) found that Internet-delivered CBT was effective in reducing social anxiety, with findings comparable to those who were assigned to receive cognitive behavioral group therapy. More relevant to the present study, Gershkovich, Herbert, Forman, Schumacher, and Fischer (2017) examined the efficacy of an Internet-delivered acceptance-based cognitive-behavioral intervention for social anxiety. Participants were randomly assigned to receive the intervention either with or without support from a therapist. Those in both conditions experienced significant reductions in social anxiety and improvements in quality of life, with no significant differences between the two conditions on either of these variables. The evidence for the usefulness of online treatments is promising, although dissemination may be an issue. For example, in Canada, although many people are using the Internet for psychoeducation, few Canadians reported seeking therapy in an online format (MacKenzie & Kocovski, 2016).

PRESENT STUDY

The present study evaluated the efficacy of *The Mindfulness and Acceptance-Based Workbook for Social Anxiety and Shyness* (Fleming & Kocovski, 2013). Our aim was to examine the utility of the book in a manner reflective of real-world settings. Because those who are seeking self-help for social anxiety are likely to be motivated because of their difficulties with anxiety in social situations, we did not believe it was necessary to include preselection criteria in the present study. It was hypothesized that community participants who were assigned to the book condition would experience significant reductions in social anxiety compared to those assigned to the wait-list control condition. Those in the book condition were also expected to significantly increase in mindfulness, acceptance, self-compassion, and life satisfaction and to decrease in cognitive fusion, post-event rumination, and depression as compared to those in the control condition.

We also aimed to evaluate acceptance, self-compassion and post-event processing as possible mechanisms of change. Acceptance is a core focus of the book and has had some support for its role in social anxiety treatment (Kocovski, Fleming, Hawley, Ho, & Antony, 2015). A lack of self-compassion characterizes people high in social anxiety (Werner et al., 2012) and ACT has been found to increase self-compassion (Yadavaia, Hayes, & Vilardaga, 2014; see also Neff & Tirch, 2013). In a recent meta-analysis, rumination mediated change in mental health outcomes (as measured by depression, anxiety, stress, etc.) for mindfulness-based interventions (Gu, Strauss,

Bond, & Cavanagh, 2015). Given that mindfulness and acceptance-based interventions encourage individuals to remain in the present moment, lower post-event rumination may also represent an important variable involved in change. Social anxiety, acceptance, self-compassion, and post-event processing were assessed weekly for those in the book condition, and it was hypothesized that changes in the process variables would be associated with subsequent changes in social anxiety.

Method

PARTICIPANTS

To be included in the study, participants had to be at least 18 years old and seeking help for shyness/social anxiety. After recruitment began, several 17-year-olds expressed interest in the study and a decision was made to expand the age inclusion criterion to include them. A total of 117 participants from the community were randomly assigned to the book (n = 58) or wait-list control (n = 59) condition. A computer-based random number generator was used to assign participants to conditions in blocks of two in order to limit size differences between conditions. The fourth and fifth authors were responsible for assigning participants to conditions. See Figure 1 for participant flow. A priori power analyses indicated that based on an estimated controlled effect size of 0.70 on the primary outcome measure and a power of 0.80, 40 participants were required per group. We planned to recruit approximately 50 participants per condition to allow for attrition. Additional participants were recruited for the book condition (n = 35) to allow for a larger sample for the mechanism of change analyses. This subsample that was not randomized appeared similar on demographics to the sample that was randomized. Participants

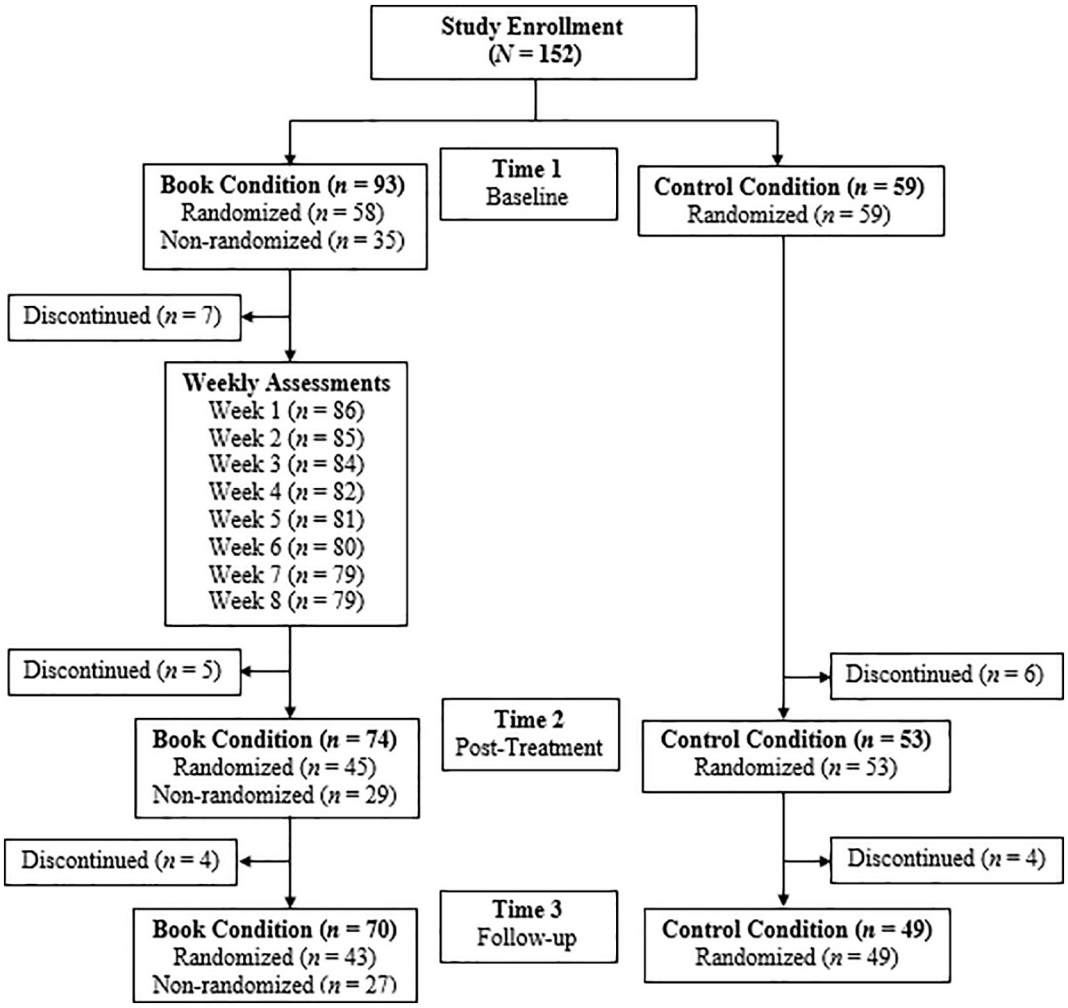

FIGURE 1 Participant flow chart for book and control conditions across three time points. Weekly assessments were collected from those in the book condition only. Sample sizes reflect the number of participants enrolled in the study at the given time.

ranged in age from 17–51 (M = 23.95, SD = 6.72), with the majority identifying as female (73.68%), single/unmarried (80.92%), and student (72.37%). The breakdown of ethnicity was as follows: White (58.55%), Asian (22.37%), South Asian (7.24%), Arab/Middle Eastern (3.29%), African Canadian (1.32%), Native Canadian (1.32%), Hispanic (1.97%), and mixed/other (3.94%). There were no differences across conditions on demographics.

MATERIALS

The materials consisted of the self-help book as well as self-report measures.

Book

Fleming and Kocovski's (2013) self-help book is largely based on ACT with enhanced mindfulness and includes materials adapted from the Kocovski et al. (2013) trial. The focus is on encouraging a mindful and accepting stance toward one's thoughts and feelings, as well as the experience of distress during anxiety-provoking social situations. There are eight chapters. The initial chapters of the book focus on an ACT-based conceptualization of social anxiety, acceptance as an alternative to control, identifying values and goals, and training in defusion strategies. Later chapters focus on acceptance-based exposure. Mindfulness practices are encouraged and available for download to accompany the book. There is an 8-week schedule within the book that readers are encouraged to follow. The focus of each week is as follows: Week 1—socialization to the model; Week 2—values and goals; Week 3—mindfulness; Week 4—acceptance of bodily sensations; Week 5—defusion; Week 6—pause and practice; Week 7—taking VITAL action; and Week 8—planning for the future. VITAL is an acronym used in the acceptance-based exposure: V = Values, I = Into the present moment, T = Take notice, AL = ALlow. The acronym is to remind readers to identify values and goals for their exposure, come into the present moment, take notice of their experience, and allow their experience to be exactly at it is.

The primary outcome variable was social anxiety assessed using two self-report measures, the Social Phobia Inventory and the Liebowitz Social Anxiety Scale. Other variables assessed included acceptance, self-compassion, mindfulness, post-event processing, and depression.

Social Phobia Inventory (Connor et al., 2000)

This 17-item scale served as a primary measure of social anxiety. Items are rated on a 5-point scale, with higher scores representing higher social anxiety. The Social Phobia Inventory (SPIN) has shown good psychometric properties in past research, including evidence for its validity (e.g., convergent and discriminant validity, sensitivity to treatment changes, etc.) and reliability (internal consistency and test-retest reliability) (e.g., Connor et al., 2000). The internal consistencies of the SPIN were excellent in the present study at each of the three time points (all αs > .93).

Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987)

The LSAS assesses both fear and avoidance of social situations. The scale consists of 24 items, and participants provide separate ratings for both fear and avoidance for each item. The self-report version of the LSAS (Baker, Heinrichs, Kim, & Hoffman, 2002) was used in the present study. In past research, the self-reported LSAS demonstrated evidence for high internal consistency and test-retest reliability, as well as convergent and discriminant validity and sensitivity to treatment changes (Baker et al., 2002). Internal consistencies for total LSAS scores were excellent at each of the three time points (all αs > .95).

Beck Depression Inventory–II (Beck, Steer, & Brown, 1996)

The Beck Depression Inventory-II (BDI-II) is a commonly used measure of depression. The scale consists of 21 items, with higher scores representing greater symptoms of depression. The psychometric properties of the scale have been very good in past research, including high internal consistency and test-retest reliability, as well as convergent, discriminant, and criterion-based validity (e.g., Wang & Gorenstein, 2013). Internal consistencies for the BDI-II was excellent at each of the three time points in the present study (all αs > .93).

Post-Event Processing Inventory–Trait form (Blackie & Kocovski, 2017)

The Post-Event Processing Inventory (PEPI) measures negative rumination following social situations and consists of both trait (PEPI-T) and state (PEPI-S) forms. Each form of the scale contains 12 items, which are represented by three factors (frequency, intensity, and self-judgment), which, in turn, are represented by a higher-order factor. Therefore, subscale scores or total PEP scores may be used on each form. Only the trait form of the scale (PEPI-T) was used in the present study. Items are rated on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*) and higher scores represent higher PEP. In past research, the PEPI displayed convergent, discriminant, concurrent, predictive, and incremental validity, and very good internal consistency and test-retest reliability for the trait form (Blackie &

Kocovski, 2017). The internal consistencies for the PEPI-T in the present study were excellent at each of the three time points (all αs > .94).

Social Anxiety—Acceptance and Action Questionnaire–Short form (SA-AAQ-SF)
A shortened version of the SA-AAQ-SF (MacKenzie & Kocovski, 2010) was created for the purpose of the present study. Items were chosen based on those with the highest face validity, which resulted in a 9-item shortened scale. Items are rated using a 7-point scale (1 = *never true*, 7 = *always true*) with total scores ranging from 9–63. A principal axis factor analysis indicated a unidimensional solution (all factor loadings > .73), which accounted for 61.07% of the variance. The factor solution was determined via factors with eigenvalues greater than one and a visual examination of the scree plot. This shortened measure positively correlated with the FMI, SCS, and SWLS (*r*s ranged from .25 to .44), negatively correlated with the LSAS, SPIN, BDI-II, PEPI-T, and CFQ (*r*s ranged from -.36 to -.74), and negatively predicted the LSAS and SPIN at posttreatment and follow-up (βs ranged from -.37 to -.43). These findings support the concurrent, discriminant, and predictive validity of this scale. The internal consistencies for the measure were excellent at each of the three time points (all αs > .92).

Freiberg Mindfulness Inventory (FMI; Walach, Buccheld, Buttenmüller, Kleinknecht, & Schmidt, 2006)
This commonly used measure assesses mindfulness as a unidimensional construct, consisting of 14 items. Item scores range from 1 (*rarely*) to 4 (*almost always*), with higher scores representing higher mindfulness. The scale has shown good psychometric properties in past research, including evidence for concurrent validity, discriminant validity, change following treatment, and high internal consistency (e.g., Walach et al., 2006). The internal consistencies in the present study ranged from very good to excellent across the three time points (all αs > .87).

Self-Compassion Scale (Neff, 2003b)
This 26-item measure assesses the three bipolar aspects of self-compassion: self-judgment versus self-kindness, isolation versus common humanity, and overidentification versus mindfulness. Items are rated on a 5-point scale (1 = *never*, 5 = *very often*) and higher total scores represent higher self-compassion. The Self-Compassion Scale (SCS) has shown good reliability and concurrent, convergent, and discriminant validity (e.g., Neff, 2003b; Neff et al., 2017), and research supports the use of subscale scores or total scale scores (Neff et al.). In the present study, internal consistencies for total scale scores were excellent at each of the three time points (all αs > .90).

Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014)
This 7-item measure assesses the extent to which individuals are preoccupied or fused with their thoughts. Items are rated on a 7-point scale, with higher scores representing greater fusion with thoughts. In past research, the CFQ demonstrated convergent, concurrent, discriminant, and incremental validity, as well as very good internal consistency and test-retest reliability (Gillanders et al., 2014). In the present study, the internal consistencies were excellent at all three time points (all αs > .93).

Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985)
This 5-item measure assesses the extent to which individuals are satisfied with their lives. Items are rated on a 7-point scale, with higher scores representing higher life satisfaction. The scale has shown concurrent and discriminant validity and very good internal consistency and test-retest reliability in past research (e.g., Pavot, Diener, Colvin, & Sandvik, 1991). In the present study, the internal consistency was very good at all three time points (all αs > .88).

Weekly Assessments
Social anxiety and treatment process variables were assessed each week among those in the book condition. Participants rated the following items on a 0–10 scale: (1) How intense has your social anxiety been (social anxiety); (2) How much have you criticized yourself for having irrational or inappropriate social anxiety (acceptance – reverse scored; taken from the SA-AAQ); (3) How much have you tried to be patient and understanding toward yourself when feeling socially anxious (self-compassion item 1; revised from SCS); (4) When feeling socially anxious, how much have you given yourself the caring and tenderness you need (self-compassion item 2; revised from SCS); and (5) How much have you gone over social situations in your mind after they have finished (post-event processing)? These single-item process variables were correlated with the relevant full-scale measures to examine their convergent validity. The social anxiety item correlated with the LSAS at .40 and the SPIN at .62; the acceptance item correlated with the SA-AAQ (short) at .73; the first self-compassion item correlated with SCS total at .57; the second self-compassion item correlated with SCS total at .78; the PEP item correlated with PEPI-T at .84 (all *p*s < .001).

Book Completion Questionnaire

At posttreatment, those in the book condition completed a measure of adherence. Participants were provided with a list of the eight chapters and, using a yes/no format, indicated whether or not they read the entire chapter. If participants did not read an entire chapter, they specified the proportion of that chapter they read.

PROCEDURE

The trial was registered in March of 2015 at clinicaltrials.gov (NCT02400918) and approved by the university research ethics board. Individuals interested in receiving self-help for social anxiety and shyness were invited to participate in the study. Flyers were posted online and around Waterloo, Ontario and participants were recruited from June 2015 to September 2016. Upon completion of the study, participants were compensated with a $24 (CAD) Amazon gift card (or a prorated amount for those who did not complete the full study).

Following a series of baseline measures (Time 1), as described above, participants were randomly assigned to the book condition (n = 58) or the wait-list control condition (n = 59) on a 1:1 ratio. At the end, an additional 35 participants were nonrandomly assigned to the book condition to improve power in analyzing the mechanisms of change within the book condition. Participants assigned to the book condition selected either a hard copy of the book (in which case they picked it up in person from the lab) or the e-book. Book condition participants were asked to follow the 8-week plan contained at the start of the book and completed the weekly assessments described above. As a reminder, they were sent an email once every 7 days. After 8 weeks had passed, all participants completed the Time 2 measures, which were the same as the Time 1 measures. Those in the book condition also filled out a book completion questionnaire. Four weeks later (12 weeks since baseline), all participants were asked to complete the measures for a final time (Time 3 measures). Those in the wait-list condition were then provided the book (hard copy or e-book, based on their preference).

Results

DESCRIPTIVE STATISTICS FOR BASELINE SOCIAL ANXIETY

In the present study, mean scores on the SPIN (M = 44.44, SD = 14.90) and LSAS (M = 85.58, SD = 28.66) were comparable to those reported in trials among those with social anxiety disorder (e.g., Dalyrmple & Herbert, 2009; Kocovski et al., 2009). Additionally, the majority of participants met previously established cutoff scores (Connor et al., 2000; Mennin et al., 2002) on the SPIN (n = 144; 94.74%) and LSAS (n = 145; 95.39%) for elevated social anxiety, as well as the cut-off on the LSAS for generalized social anxiety (n = 128; 84.21%).

ATTRITION AND MISSING DATA

Information regarding attrition can be found in the participant flow chart (see Figure 1). A total of 14.26% of the data were missing. This includes partial missing data from treatment completers (9.38%), as well as missing data from noncompleters (4.88%). The missing parameters were estimated using full information maximum likelihood estimation.

BOOK COMPLETION

Within the book condition, 60.42% of participants fully read each chapter, 4.17% reported reading at least half, and 20.83% read less than half of the book. Additionally, 10.42% did not read any of the book, and 4.16% did not answer. Data from all participants were used in the analyses, regardless of adherence to treatment protocol.

COMPARING CONDITIONS

Hierarchical linear modeling (HLM) was used to assess differences between conditions over time on several outcome variables. The outcome variables were as follows: social anxiety (LSAS, SPIN), depression (BDI-II), post-event processing (PEPI), acceptance (SA-AAQ), mindfulness (FMI), self-compassion (SCS), cognitive fusion (CFQ), and life satisfaction (SWLS). Data were analyzed using the Hierarchical Linear Modeling, Version 7 software (Raudenbush, Bryk, & Congdon, 2011). Full information maximum likelihood estimation was used to determine the appropriate model for each outcome variable. In each analysis, time was added to the first level of the model (pretreatment = 0, posttreatment = 8, and follow-up = 12) and condition was added to the second level (1 = book condition, 0 = wait-list control). Analyses are based on the sample of 117 participants that had been randomized (book condition, n = 58; wait-list control condition, n = 59). However, 2 cases were automatically dropped by the HLM software due to insufficient data.

Based on the null model for each outcome variable, there was a substantial amount of variance associated with level two, thereby supporting the use of a multilevel model (LSAS = 66.20%, SPIN = 66.44%, BDI-II = 59.24%, PEPI-T = 58.22%, short SA-AAQ = 58.87%, FMI = 44.73%, SCS = 57.65%, CFQ = 60.47%, SWLS = 73.42%). The final, mixed model for each outcome

variable can be represented by the following equation, with the exception of life satisfaction (SWLS), in which the slopes of time did not randomly vary across participants (i.e., omit r_{1i}*$time_{t,i}$ from the equation for SWLS):

$$\begin{aligned} Outcome_{t,i} = {}& {}_{00} + {}_{01}{}^{*}condition_i + {}_{10}{}^{*}time_{t,i} \\ & + {}_{11}{}^{*}condition_i{}^{*}time_{t,i} + r_{0i} \\ & + r_{1i}{}^{*}time_{t,i} + e_{t,i} \end{aligned}$$

Using the equation above, we can calculate a score for individual i at time t on each outcome variable. The mean scores on each outcome variable, per condition, at the three time points are shown in Table 1, and model coefficients can be found in Table 2. Unexpectedly, those in the control condition scored significantly lower on baseline levels of mindfulness (FMI) and life satisfaction (SWLS) than those in the book condition (β_{01}). However, the control condition did not show any significant change across time on any outcome variables (β_{10}), whereas the book condition showed significant change over time, in the hypothesized directions, on all outcome variables, compared to the control condition (β_{11}). There was also significant variation across participants' baseline scores (r_0) as well as their amount of change across time (r_0) for all outcome variables. Also shown in Table 2 is the proportion of variance in time explained by condition and the proportion of variance in the outcome variable explained by time. Effect sizes were calculated following Feingold (2009), equation 5. Change across time on measures of social anxiety in the book and control conditions are depicted in Figure 2a and b.

Table 1
Mean Differences Between Conditions Across Time on Outcome Variables

	Book Condition		Control Condition	
Measure	*M*	*SD*	*M*	*SD*
Liebowitz Social Anxiety Scale (Total)				
Pre-Treatment	83.93	29.32	83.50	27.61
Post-Treatment	65.39	27.56	80.54	28.07
Follow-up	56.12	24.46	79.06	32.00
Social Phobia Inventory				
Pre-Treatment	43.17	14.24	43.25	14.25
Post-Treatment	34.70	11.89	41.83	14.27
Follow-up	30.46	12.43	41.11	14.03
Beck-Depression Inventory – II				
Pre-Treatment	21.68	13.26	24.39	11.69
Post-Treatment	16.11	10.41	24.26	12.62
Follow-up	13.32	11.16	24.19	14.55
Post-Event Processing Inventory – Trait				
Pre-Treatment	44.86	10.21	46.51	8.37
Post-Treatment	39.84	9.21	46.43	7.83
Follow-up	37.33	9.79	46.39	9.45
Social Anxiety - Acceptance and Action Questionnaire (Short-Form)				
Pre-Treatment	30.26	9.87	28.38	12.06
Post-Treatment	36.90	9.78	28.87	11.10
Follow-up	40.22	10.04	29.11	11.76
Freiburg Mindfulness Inventory				
Pre-Treatment	30.52	7.46	27.11	7.16
Post-Treatment	34.62	7.21	28.39	5.41
Follow-up	36.67	7.54	29.02	7.66
Self-Compassion Scale (Total)				
Pre-Treatment	69.78	12.35	65.52	11.77
Post-Treatment	78.42	16.10	66.57	12.37
Follow-up	82.74	14.02	67.10	12.67
Cognitive Fusion Questionnaire				
Pre-Treatment	33.92	10.60	35.16	9.29
Post-Treatment	29.30	8.33	34.37	8.73
Follow-up	26.99	8.62	33.97	8.82
Satisfaction with Life Scale				
Pre-Treatment	18.80	7.76	15.27	6.24
Post-Treatment	21.04	6.38	15.89	6.57
Follow-up	22.16	6.35	16.21	6.58

Note. The mean slope for each outcome variable was significant for the book condition but not for the control condition. Time was coded such that pre-treatment = 0, post-treatment = 8, and follow-up = 12. Book condition, n = 58; Control condition, n = 59.

WITHIN-CONDITION CHANGE ON SOCIAL ANXIETY

Means and standard deviations for all participants assigned to the book condition (n = 93) are provided in Table 3. The corresponding correlation matrices are available upon request. Latent Change Score modeling (LCS; McArdle, 2009; McArdle & Hamagami, 2001) was used to examine longitudinal change in social anxiety and its reciprocal relationship with hypothesized process variables among those assigned to the book condition. The four process variables expected to play a role in change of socially anxious symptoms were: (a) acceptance of social anxiety, (b) understanding and patience of socially anxious symptoms (first self-compassion item), (c) caring and tenderness of socially anxious symptoms (second self-compassion item), and (d) rumination following socially anxious situations. These variables were examined across 10 time points, including the pre-book assessment (Time 1), the eight weekly assessments (Times 2–9), and the 4-week follow-up (Time 10).

All univariate and bivariate LCS models were analyzed using Analysis of Moment Structures, Version 22 (AMOS; Arbuckle, 2013). Full information maximum likelihood estimation was used to handle missing data. Model selection was

Table 2
HLM Results: Differences Between Conditions Across Time on Outcome Variables

Outcome	β_{01}	β_{10}	β_{11}	d	r_0	r_1	Var. in time explained by condition	Var. in outcome explained by time
LSAS	0.41	-0.36	-1.95***	0.79	623.24***	0.88***	57.33%	46.77%
SPIN	-0.15	-0.19	-0.89***	0.74	168.03***	0.48***	33.48%	58.50%
BDI-II	-2.55	-0.03	-0.68***	0.61	105.45***	0.61***	14.88%	45.52%
PEPI-T	-1.74	-0.02	-0.61***	0.72	54.37***	0.14**	38.92%	32.66%
SA-AAQ	2.46	0.11	0.70***	0.95	103.22***	0.60***	16.64%	63.39%
FMI	3.38*	0.17	0.36*	0.56	35.79***	0.28***	12.99%	92.32%
SCS	4.33	0.15	0.93***	0.92	107.61***	0.69***	21.51%	51.67%
CFQ	-1.24	-0.11	-0.47**	0.53	81.31***	0.40***	10.26%	57.27%
SWLS	3.50**	0.08	0.20*	0.28	37.88***	0.07***	10.67%	27.59%

Note. Condition was coded such that 1 = book condition and 0 = wait-list control. β_{00} refers to the mean pre-treatment score in the control condition, which can be found in Table 1. β_{01} = coefficient for differences between conditions at pre-treatment. β_{10} = coefficient for the referent group in predicting the slopes of time (i.e., unstandardized mean growth rate for the control condition). β_{11} = coefficient for differences between conditions in predicting the slopes of time (i.e., unstandardized difference between conditions on mean growth rate). d = difference in standard deviations between the two conditions on rate of change for the outcome variable. r_0 = randomly varying intercept (baseline score). r_1 = randomly varying slopes of time (change across time). LSAS = Liebowitz Social Anxiety Scale. SPIN = Social Phobia Inventory. BDI-II = Beck Depression Inventory – II. PEPI-T = Post-Event Processing Inventory – Trait form. SA-AAQ = Social Anxiety - Acceptance and Action Questionnaire (short-form). FMI = Freiburg Mindfulness Inventory. SCS = Self-Compassion Scale. CFQ = Cognitive Fusion Questionnaire. SWLS = Satisfaction with Life Scale. Var. = variance.
* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

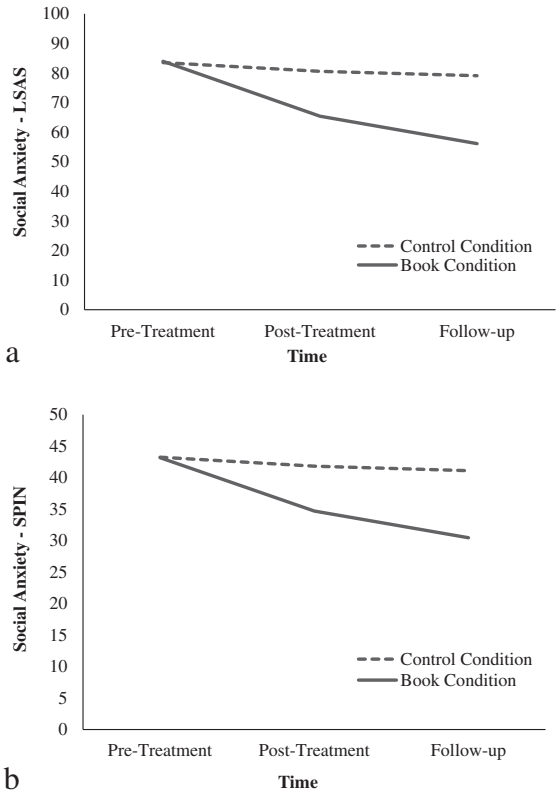

FIGURE 2 a. Results from hierarchical linear modeling depicting change across time on the Liebowitz Social Anxiety Scale (LSAS) in the book and control conditions. b. Results from hierarchical linear modeling depicting change across time on the Social Phobia Inventory (SPIN) in the book and control conditions.

determined through use of model fit indices, including chi-square (χ^2), comparative fix index (CFI), root mean square error of approximation (RMSEA), and the Akaike information criterion (AIC).

Univariate Models

Separate univariate models were used to determine how each of the five variables (social anxiety, acceptance, self-compassion–understanding, self-compassion–caring, and rumination) change over time, in an independent manner. Four types of univariate models were examined for each variable: the no change model, the additive constant change model, the proportional change model, and the dual change model. Both time-varying and time-invariant proportional effects were considered.

Both social anxiety and acceptance were best represented by dual change univariate models with time-varying proportional effects (social anxiety: χ^2 [50] = 60.06, p = .16, CFI = .98, RMSEA = .05, AIC = 90.06; acceptance: χ^2 [50] = 76.23, p = .01, CFI = .93, RMSEA = .07, AIC = 106.23), whereas both self-compassion items (understanding and caring) were best represented by dual change univariate models with time-invariant proportional effects (understanding: χ^2 [58] = 79.89, p = .03, CFI = .94, RMSEA = .06, AIC = 93.89; caring: χ^2 [58] = 83.18, p = .02, CFI = .94, RMSEA = .07, AIC = 97.18). Although a time-invariant, dual change model provided the best fit for rumination, the model fit indices were fairly low (χ^2 [58] = 105.00,

Table 3
Descriptive Statistics for Social Anxiety Symptoms and Process Variables Across Time

	Social Anxiety		Acceptance		Self-Comp. Understanding		Self-Comp. Caring		Post-Event Processing	
Time	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Time 1	6.58	1.92	4.10	2.11	4.89	2.33	4.13	2.24	7.21	2.46
Time 2	6.12	1.80	4.56	2.09	5.54	2.16	4.73	2.12	7.22	2.35
Time 3	5.67	1.86	5.29	1.94	5.43	1.85	5.29	1.86	6.71	2.46
Time 4	5.73	2.01	5.83	2.05	5.62	1.94	5.52	2.19	6.35	2.32
Time 5	5.36	2.10	5.83	2.00	5.83	1.69	5.58	1.82	5.95	2.24
Time 6	5.70	2.05	5.85	1.99	5.81	1.94	5.59	2.23	6.09	2.18
Time 7	5.29	2.53	6.39	2.29	5.87	2.01	5.86	2.07	5.74	2.30
Time 8	5.24	2.27	6.20	2.21	5.79	2.06	5.90	2.09	5.58	2.31
Time 9	4.82	2.17	6.66	1.91	6.27	2.15	6.07	2.12	5.34	2.21
Time 10	4.91	2.30	6.81	2.08	5.74	2.33	5.67	2.14	5.46	2.54

Note. Self-comp = self-compassion.

$p < .001$, CFI = .91, RMSEA = .09, AIC = 119.00). Therefore, rumination was not examined in a bivariate model.

Bivariate Models

To determine the reciprocal relationship between social anxiety and each of the hypothesized process variables, bivariate models were examined. The bivariate model was used to determine the reciprocal relationship (coupling) between two univariate processes. In other words, we can examine if scores on one variable (at the previous time point) predict subsequent change in scores in the other variable, and vice versa. Four bivariate models were examined: (a) a no coupling model, in which neither variable *X* nor variable *Y* predict subsequent change in the other, (b) a unidirectional model, in which *X* predicts subsequent change in *Y*, (c) a unidirectional model in which *Y* predicts subsequent change in *X*, and (d) a bidirectional model in which both *X* and *Y* predict subsequent change in one other. These four bivariate models were considered for social anxiety and acceptance, social anxiety and understanding, and social anxiety and caring. Finally, to account for error resulting from specific assessment occasions, the error terms were correlated between constructs measured at the same time. These correlated error terms were set equal across time, as has been done by other researchers (e.g., Radkovsky, McArdle, Bockting, & Berking, 2014).

Unexpectedly, there was no support for a reciprocal relationship between social anxiety and either of the self-compassion items (understanding or caring). All bivariate models between social anxiety and understanding (i.e., no coupling, the two unidirectional models, and the bidirectional model) had low model fit indices and thus the parameter estimates were not interpreted. Additionally, although the model fit indices were good for all bivariate models between social anxiety and caring, the coupling parameter was not significant in either unidirectional model or in the bidirectional model (all $ps > .25$).

With respect to social anxiety and acceptance, as hypothesized, we found support for a bivariate model (see Table 4). The best-fitting bivariate model was the unidirectional model in which acceptance negatively predicted subsequent change in social anxiety (see Figure 3). Although the bidirectional model had very similar fit indices, only the coupling parameters in which acceptance predicted subsequent change in social anxiety were significant. Therefore, the bidirectional model was rejected in favor of the aforementioned unidirectional model.

As expected, initial social anxiety was positively correlated with change in social anxiety symptoms ($\rho_{0,s}$). This finding indicates that those with initially higher social anxiety tended to experience greater change in social anxiety symptoms, and vice versa. However, this was not the case for acceptance, as initial scores and change in acceptance were not significantly correlated ($\rho_{0,s}$). Also as expected, initial social anxiety negatively correlated with initial acceptance ($\rho_{y0,x0}$) and change in acceptance ($\rho_{y0,xs}$). This latter finding demonstrates that those who were initially higher on social anxiety tended to experience less overall change in acceptance, and those who were initially lower on social anxiety tended to experience greater change in acceptance. Initial acceptance, however, was unrelated to change in social anxiety ($\rho_{ys,\ x0}$).

As expected, both social anxiety and acceptance had a significant mean slope (μ_s), suggesting meaningful overall change on these variables. Furthermore, change in acceptance randomly varied across

Table 4
Bivariate Models for the Relationship Between Social Anxiety and Acceptance

Parameters/	No coupling		SA → Accept		SA ← Accept		SA←→Accept	
Fit Indices	SA	Accept	SA	Accept	SA	Accept	SA	Accept
Fixed Parameters								
Loading α	1(=)	1(=)	1(=)	1(=)	1(=)	1(=)	1(=)	1(=)
Proportion β	-0.15**	-0.38**	-0.14**	-0.43**	-0.45**	-0.27**	-0.51**	-0.16
Proportion β	-0.14**	-0.31**	-0.13*	-0.37**	-0.43**	-0.22*	-0.50**	-0.11
Proportion β	-0.08	-0.29**	-0.07	-0.35**	-0.35*	-0.22*	-0.42**	-0.11
Proportion β	-0.15*	-0.35**	-0.14*	-0.41**	-0.39**	-0.28**	-0.45**	-0.18
Proportion β	-0.05	-0.33**	-0.05	-0.39**	-0.32*	-0.25**	-0.38**	-0.13
Proportion β	-0.13*	-0.28**	-0.12 †	-0.34**	-0.36**	-0.23**	-0.42**	-0.12
Proportion β	-0.13*	-0.33**	-0.12 †	-0.39**	-0.36**	-0.27**	-0.42**	-0.16
Proportion β	-0.16**	-0.27**	-0.16*	-0.33**	-0.40**	-0.20**	-0.42**	-0.12
Proportion β	-0.10	-0.28**	-0.09	-0.34**	-0.34**	-0.21**	-0.46**	-0.09
Coupling γ	0(=)	0(=)	-0.09	0(=)	0(=)	-0.34*	0.16	-0.39**
Intrcpt mean μ_0	6.57**	4.09**	6.57**	4.08**	6.57**	4.09**	6.55**	4.12**
Slope mean μ_s	0.47	2.06**	0.43	2.89*	3.80*	1.65**	4.45**	0.15
Random Parameters								
Intrcpt variance σ^2_0	2.29**	2.53**	2.28**	2.56**	2.27**	2.29**	2.36**	2.14**
Slope variance σ^2_s	0.10	0.26*	0.10	0.24*	0.15	0.18*	0.19	0.24*
Error variance σ^2_e	1.35**	2.05**	1.35**	2.05**	1.31**	2.05**	1.29**	2.05**
Correlations								
Intrcpt, slope $\rho_{0,s}$	.46 †	.44*	.44	.39	.52*	.40	.54*	.47*
Intrcpt *y*, intrcpt *x* $\rho_{y0,x0}$	-.80**		-.81**		-.75**		-.74**	
Intrcpt *y*, slope *x* $\rho_{y0,\ xs}$	.43*		-.31		-.45*		-.63*	
Slope *y*, intrcpt *x* $\rho_{ys,\ x0}$	-.34		-.34		-.19		-.16	
Slope *y*, slope *x* $\rho_{ys,xs}$	-.88**		-.81 †		-.38		-.59	
Error *y*, Error *x* $\rho_{ye,xe}$	-.47**		-.47**		-.47**		-.47**	
Model Fit Indices								
Est parameters (df)	35 (195)		36 (194)		36 (194)		37 (193)	
χ^2	310.22**		309.95**		303.58**		302.32**	
χ^2/df	1.59		1.60		1.57		1.57	
CFI	.91		.91		.93		.93	
RMSEA	.08		.08		.07		.07	
AIC	380.22		381.95		375.58		376.32	

Note. All parameters are in unstandardized form, with the exception of the correlations. *y* = social anxiety. *x* = acceptance. (=) represents a parameter fixed at the specified value. Intrcpt = Intercept. Est = Estimated. SA = Social Anxiety. Accept = Acceptance. Subscript 0 = initial score. Subscript s = slope. Subscript e = error.
† $p = .06$. * $p \leq .05$. ** $p \leq .01$.

participants (σ^2_s), although change in social anxiety did not. This finding suggests that there were significant differences across participants on change in acceptance. Unexpectedly, however, average change in social anxiety was not significantly correlated with average change in acceptance ($\rho_{ys,\ xs}$). However, as expected, acceptance negatively predicted subsequent change in social anxiety (γ). This finding indicates that those who were more accepting of their socially anxious symptoms tended to experience greater reductions in subsequent levels of social anxiety.

Using the equations below, we can calculate a latent change score for individual *i* at time *t* on social anxiety (SA) and acceptance (Accept). Table 5 shows the initial and expected means for social anxiety and acceptance across the 10 time points.

$$\Delta SA\,[\mathrm{t}]_i = \alpha^*_{SA} SA_{s,i} + \beta_{SA}{}^* SA[\mathrm{t\text{-}1}]_i + \gamma_{SA,Accept}{}^* Accept[\mathrm{t\text{-}1}]_i$$

$$\Delta Accept[\mathrm{t}]_i = \alpha_{Accept}{}^* Accept_{s,i} + \beta_{Accept}{}^* Accept[\mathrm{t\text{-}1}]_i$$

Discussion

The purpose of the present study was to evaluate the impact of a mindfulness and acceptance-based self-help book on symptoms of social anxiety and related outcomes. Participants in the book condition fared better than those in the control condition on all variables assessed, including social anxiety,

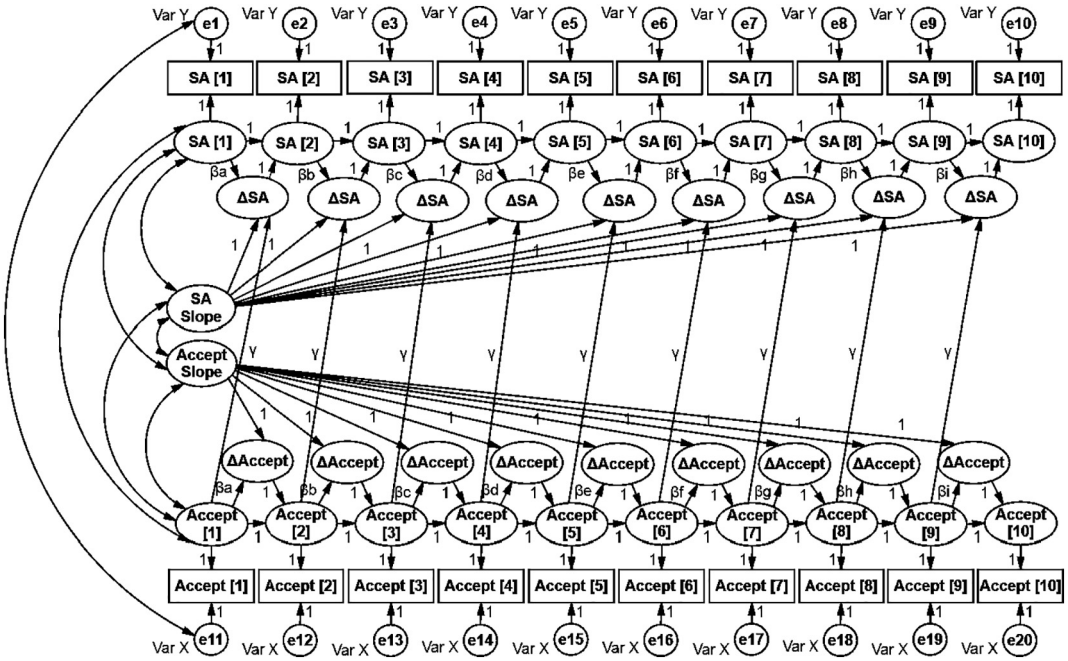

FIGURE 3 Bivariate (unidirectional) latent change score model, with acceptance negatively predicting subsequent change in social anxiety. Error covariances (set equal across time) were included in the model between constructs measured at the same time; however, for ease of interpretation, only the error covariance at time one is included in the figure. SA = Social Anxiety. Accept = Acceptance. Var = Variance. Δ = latent change score. β = proportion parameter. γ = coupling parameter. Coupling parameters were set equal across time. Proportion parameters were set unequal across time and unequal across constructs. Means of error variables and intercepts of endogenous latent variables and observed variables were set to zero.

acceptance, mindfulness, rumination, depression, and self-compassion. The effect sizes on the social anxiety symptom measures were medium to large (.7 to .8), not far from the large effect sizes (approximately 1.0) obtained in face-to-face ACT trials (Craske et al., 2014; Kocovski et al., 2013). These results are important given that empirically supported treatments are not available in many geographic locations and are costly. Self-help has the potential to reach many people who would otherwise not seek treatment.

We also focused on mechanisms of change. We hypothesized that the book would help people have greater acceptance and self-compassion, as well as reduced rumination, and that these changes would be associated with improvements in social anxiety symptoms. There was support for this model for acceptance: increases in acceptance were associated with subsequent decreases in social anxiety. Although higher baseline social anxiety was associated with less change in acceptance over time, those with initially higher social anxiety typically experienced greater reductions in socially anxious symptoms. In other words, those who needed the book most tended to benefit more greatly. However, this may also suggest that other mechanisms are involved in change and should be examined in future research. Although self-compassion increased and rumination decreased, the bivariate latent change score models were not supported for

Table 5
Expected Change in Social Anxiety and Acceptance Using the Bivariate Latent Change Score Model

Initial and Expected Mean Scores	Social Anxiety	Acceptance
Initial Mean Score		
Time 1	6.57	4.09
Expected Mean Score		
Time 2	6.02	4.64
Time 3	5.65	5.27
Time 4	5.68	5.76
Time 5	5.31	5.80
Time 6	5.44	6.00
Time 7	5.24	6.27
Time 8	5.02	6.23
Time 9	4.69	6.63
Time 10	4.64	6.89

Note. Calculations were obtained using the formulas: $\Delta SA[t]_i = \alpha_{SA}{}^{*}SA_{s,i} + \beta_{SA}{}^{*}SA[t\text{-}1]_i + \gamma_{SA,Accept}{}^{*}Accept[t\text{-}1]_i$ and $\Delta Accept[t]_i = \alpha_{Accept}{}^{*}Accept_{s,i} + \beta_{Accept}{}^{*}Accept[t\text{-}1]_i$.

those variables. The book is strongly focused on acceptance and includes exercises geared toward acceptance of thoughts and feelings. Although these exercises are done in a self-compassionate manner, there are no explicit self-compassion practices in the book. In the end, perhaps it is not surprising that the mechanism that is the most explicitly targeted in the book was the only one supported in our analyses. Alternatively, we cannot rule out demand characteristics—namely, that because the book focuses on acceptance, participants reported increased acceptance across time. Notwithstanding this limitation, it is compelling that there is evidence that the book is effective for the reason it is supposed to be effective.

Our goal was to evaluate the book in a way that is similar to how it is used by the general public. To that end, we recruited participants who were seeking self-help for social anxiety or shyness, and we did not require a formal diagnosis of social anxiety disorder or a certain level of symptoms or impairment. We believe that actively seeking self-help for a problem is a sufficient indicator of need for service and that a cutoff score on a scale, although useful, is not essential for making that determination. Certainly, the mean scores for the social anxiety measures are in line with randomized controlled trials with much stricter inclusion criteria (e.g., Kocovski et al., 2013). However, even though over 80% of participants scored above the cutoff on the LSAS for generalized social anxiety, we did not measure degree of impairment and it may be that it was less than in a clinical sample. It is possible that the book may be less effective at more severe levels of social anxiety and it is therefore important to examine its utility among those with formally diagnosed social anxiety disorder with significant impairment. Also related to inclusion and exclusion criteria, we originally required that participants be at least 18 years of age, similar to our past trials, but then had several 17-year-olds express interest in the study. In that our goal was to evaluate the book as it might be used by the general population, we revised our criteria and allowed (three) 17-year-old participants, given they are part of the population that would potentially use the book. Finally, although participants were recruited from the community, a fair number identified as being university students.

Another limitation of the study is that the comparison condition was a wait-list control rather than an active alternative treatment. Our goal was to evaluate the effectiveness of the book compared to doing nothing at all, rendering our design appropriate. A next step might be to compare a mindfulness and acceptance-based self-help book with a commonly used traditional CBT book for social anxiety (e.g., Antony & Swinson, 2017), ruling out a possible placebo effect. It is noteworthy that our findings are similar to those reported by Abramowitz et al. (2009), who evaluated a previous edition of Antony and Swinson's book. An additional limitation regarding the control condition was that these participants were initially lower on baseline levels of mindfulness and life satisfaction than those in the book condition, and these differences may have influenced the findings in the present study.

Other limitations include attrition, the use of single-item assessments for our weekly process measures, and reliance on self-report. About a fifth of our participants did not complete the posttreatment assessment. Attrition has varied widely in similar studies evaluating self-help books. Abramowitz et al. had no dropouts in their social anxiety book study of 21 participants, which included minimal therapist contact, whereas Ritzert et al. (2016) reported greater than half of their 256 participants did not complete the posttreatment assessment in their ACT for anxiety workbook study, which included no therapist contact or weekly measures. Our study also had no therapist contact but did include brief online weekly assessments; however, these check-ins may have led to greater adherence than in a more naturalistic setting. Although the psychometric properties of full measures of the process constructs are perhaps stronger than the single-item measures used, asking participants to complete longer questionnaires on a weekly basis may have led to further attrition and missing data. Additionally, some of these items were only moderately correlated with the full scales, whereas other items were much more strongly related. Finally, outcomes were assessed using self-report only. Although it would have been preferable to have included behavioral outcomes as well as assessments by a blind rater, these would have necessitated additional funding and required participants to come to the lab. The study was designed such that if participants opted for the e-book, they could complete all aspects of the study online. Future research can evaluate change in behavioral measures such as speech and/or social interaction tasks before and after receiving self-help treatment. There is a lack of research on behavioral outcomes for self-help trials.

Overall, the present study supports that a mindfulness and acceptance-based self-help approach to the treatment of social anxiety is viable, leading to effect sizes not far from those reported in face-to-face ACT and traditional CBT trials (Craske et al., 2014; Kocovski et al., 2013), and that

increasing acceptance is an important treatment target.

Conflict of Interest Statement

The authors gratefully acknowledge that financial support for this research was received from a grant partly funded by Laurier Operating funds awarded to the first author. Jan Fleming and Nancy Kocovski are co-authors of the self-help book evaluated in this research. The remaining authors declare that they have no conflicts of interest.

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