Psychological Flexibility in South Sudanese Female Trauma Survivors in Uganda as a
Mechanism for Change Within a Guided Self-Help Intervention

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Abstract

Introduction: Acceptance and commitment therapy (ACT) has a rapidly developing evidence base, with few studies in the developing world or humanitarian context. A recent trial of a guided self-help intervention derived from ACT reported significant positive findings, but the extent to which the central principles of this intervention were maintained and implemented have not been explored.

Objective: To examine the role of psychological flexibility as a potential mediator in the relationship between involvement in a guided self-help intervention, Self Help Plus, and psychological distress in a sample of South Sudanese refugee women living in northern Uganda.

Methods: We conducted secondary analysis of data from a cluster randomized controlled trial conducted in 2018. We used multilevel mediation modeling to explore the relationship of psychological flexibility, as measured by the Acceptance and Action Questionnaire (AAQ-II), as a mediating factor in the relationship between Self Help Plus involvement and general psychological distress as measured by the Kessler-6 (K6).

Results: We found strong multilevel mediation of decreased K6 scores in the treatment group by AAQ-II scores (multilevel $b = -3.28$). A more pronounced mediation effect was discovered immediately post intervention ($b = -1.09$) compared to 3-month follow-up ($b = -0.84$). This is in line with the current literature that demonstrates the role of psychological flexibility as a primary mechanism of change in ACT-based interventions.

Conclusions: Psychological flexibility is a contributing component in the theory of change for this ACT-based intervention. Identifying the core components of interventions allows for more effective adaptation and implementation of relevant services, especially in low-resource contexts.

Background & Significance

Conflict-affected populations experience elevated rates of psychological distress and mental disorders (Steel et al., 2009). A recent systematic review and meta-analysis estimates that 22.1% of people in conflict settings meet criteria for a mental disorder, specifically depression, anxiety, and posttraumatic stress disorder (PTSD) (Charlson et al., 2019). In recent years, research has established a growing evidence base for effective mental health and psychosocial support (MHPSS) interventions among conflict-affected populations (Bangpan et al., 2019; Haroz et al., 2020; Tol et al., 2011). These interventions typically target a specific mental disorder (e.g., PTSD, major depressive disorder) and are usually delivered in one-on-one individual or group sessions (Purgato et al., 2018). Although the evidence for the effectiveness of task-shared psychotherapies, i.e., interventions implemented by non-specialists trained in a given MHPSS protocol, has grown steadily in recent years, implementing and scaling these evidence-based psychological interventions in low-resource humanitarian settings remains a major challenge.

Task-shared psychotherapies still require a cadre of mental health specialists to train and supervise non-specialist providers. In humanitarian settings, there are typically limited mental health specialists available (Epping-Jordan et al., 2016). In other settings, it is worth noting that no mental health specialists might be available outside the private sector (e.g., Purgato et al., 2021). In addition, one-on-one delivery formats can limit the number of people who can receive the intervention and increase the size of the workforce needed to provide it. Group-based interventions might also reduce stigma associated with mental health problems in conflict settings and promote their acceptability in such contexts (Murray et al., 2018). By developing separate intervention protocols that target specific mental disorders, the development of a robust

mental health system requires non-specialist providers to be trained in many different intervention protocols to address a range of disorders. Limiting treatment to individuals who meet criteria for a mental disorder neglects the mental health needs of people with prodromal symptoms who are experiencing more generalized psychological distress, which is known to be associated with functional impairment (Tol et al., 2020).

There is growing evidence for the potential of broad-based mental health programming as a preventative intervention for psychological distress by integrating basic psychological screening and stress management skills training into existing infrastructure (e.g., primary care or community centers) (Tol et al., 2019; Turner et al., 2020). To further explore the feasibility of such interventions, the World Health Organization (WHO) developed a psychological stress management intervention called Self-Help Plus (SH+) specifically designed for settings with limited or no mental health specialists, particularly settings with limited humanitarian access (Epping-Jordan et al., 2016). SH+ is a five-session stress management intervention based on Acceptance and Commitment Therapy (ACT; Hayes et al., 2011), an empirically based, third-wave cognitive-behavioral therapy. ACT aims to increase psychological flexibility by employing acceptance and mindfulness strategies to learn new ways to approach unwanted thoughts and feelings. Rather than trying to actively avoid or suppress negative feelings, which often results in worsening negative thoughts and feelings, ACT encourages mindfulness-based strategies to experience thoughts and feelings. ACT also promotes identification and engagement of engaging in activities driven by personal values (Hayes et al., 2009). SH+ utilizes such strategies to address psychological distress more broadly rather than focusing on treating a specific disorder. The intervention follows a guided self-help format, i.e., self-help content delivered by facilitators in a group (workshop) format. Pre-recorded sessions are supplemented with a pictorial workbook

designed for low-literacy populations (Epping-Jordan et al., 2016). This delivery model allows a greater number of people to access the intervention at a time (usually delivered in workshops of 20-30 people) and it reduces the need for a trained mental health provider, although training and supervision by a clinical specialist are still necessary. The inclusion of pre-recorded sessions decreases training needs and increases provider fidelity to evidence-based techniques, making implementation and scaling of this psychological intervention more feasible in resource-constrained humanitarian settings.

Three randomized controlled trials have been completed with conflict-affected populations in various settings to examine the effectiveness of SH+ in reducing psychological distress and improving functioning (Purgato et al., 2019; Tol et al., 2020). Our team evaluated SH+ in a cluster-randomized controlled trial with South Sudanese female refugees living in northwestern Uganda and found that participants who received SH+ reported significantly greater reductions in psychological distress, a range of psychological difficulties (posttraumatic stress, depression, anger), functional impairment, and subjective wellbeing at post-treatment and at three-month follow-up compared to the control condition (Tol et al., 2020). Although these are promising outcomes, the mechanisms through which SH+ produced its therapeutic effects have yet to be established.

To implement SH+ in real-world humanitarian settings, it is important to understand how and why the treatment works. This will help ensure that the components responsible for change are maintained and not unintentionally weakened during implementation. It will also allow us to better understand what adaptations can be made to the intervention for different contexts, while maintaining fidelity to the ‘core’ ingredients and key mechanisms of change. Lastly, it will allow a greater understanding of what adaptations might be made to this intervention within different

contexts while maintaining fidelity to the core principles and key mechanisms of change. The first step to understanding the mechanism of change is often examining mediators (Kazdin, 2007). In an ACT framework, the primary proposed mechanism of change is purported to be psychological flexibility- the ability to feel and think with openness, to attend voluntarily to your experience of the present moment, and to move your life in directions that are important to you, building habits that allow you to live in accordance with your values and aspirations (Hayes, 2019). It is often understood as comprising of the interrelated components of i) present moment awareness or mindfulness, ii) acceptance of internal experiences; iii) cognitive defusion; iv) identification of values; v) committed action in line with those values; and; vi) self-as-context, or the ability to observe our internal experiences as separate to us. Conversely, psychological *inflexibility* can lead to ineffective cognitive patterns such as rumination and worry, unhelpful behaviors, less capacity to manage stressful events, and difficulties in setting and working towards longer-term goals (Kashdan & Rottenberg, 2010). Therefore, we would expect psychological flexibility to be a significant mediator in the relationship between treatment and mental health-related outcomes in our sample. Psychological flexibility has been linked to various forms of psychological distress, wellbeing, health behaviors and outcomes, and interpersonal processes such as parenting and workplace functioning (Boulanger et al., 2010; Hayes et al., 2013; Kashdan & Rottenberg, 2010). Furthermore, it is a known mediator of the impact of ACT interventions on reduced mental health problems in studies conducted in high-income contexts. In a recent meta-analysis of ACT trials conducted in Europe and the US (Stockton et al., 2019), psychological flexibility strongly mediated the relationship between the type of therapy and mental health outcomes, patient functioning, and physical symptom reduction.

Since SH+ is based on the same underlying theoretical model of ACT and targets each of the components of psychological flexibility, we would expect psychological flexibility to be a significant mediator in the relationship between treatment and mental health-related outcomes in our sample. A growing number of studies point to cross-cultural relevance and validity of the construct and the tools used to measure it, and the consistent link between psychological flexibility and health outcomes, including in populations from China, Taiwan, Japan, and Asian Americans (Lin et al., 2019), Hispanic college students in the USA (Monestès et al., 2018), and across seven countries and six language communities in Europe (Flynn, 2016). However, given the limited number of implementation studies of ACT in LMICs or low-resource humanitarian settings, the extent to which these effects would remain consistent in a novel context and in a less resource-intensive version of the intervention is unknown. Accordingly, the purpose of the current study is to examine the extent to which psychological flexibility mediated the relationship between SH+ and psychological distress in a cluster randomized controlled trial with South Sudanese female refugees living in northwestern Uganda.

Methods

Setting and Participants

These data were collected as part of a cluster randomized controlled trial conducted in Rhino Camp settlement in northern Uganda (Tol et al., 2020). Participants were all female South Sudanese refugees living in Rhino Camp, a large refugee settlement on the site of a former nature preserve. The camp consists of many different village-like settlements, which served as natural clusters for the randomization process. Fourteen villages were randomized to receive either (1) enhanced usual care (i.e., psychoeducation and existing mental health services) or (2) enhanced usual care and the SH+ intervention. Participants were assessed for psychological

distress, trauma history, psychological flexibility, and other psychosocial outcomes at baseline, one week following the final session of SH+, and three months following the post-intervention assessment. The findings and structure of the trial are reported elsewhere (Tol et al., 2020). For the purposes of the current study, we only included participants with psychological distress, trauma, and psychological flexibility data available at all three timepoints.

Measures

Outcome data were collected at the individual level rather than the cluster/village level. All measures were translated and back-translated into Juba Arabic during the initial pilot phases of the trial. All outcome measures included were further reviewed by independent South Sudanese mental health experts to ascertain clinical validity and piloted prior to use in the full trial. Processes related to the development and adaptation of our measures can be found elsewhere (Tol, Augustinavicius, Carswell, Brown, et al., 2018; Tol, Augustinavicius, Carswell, Leku, et al., 2018).

General psychological distress, the study's primary outcome, was measured using the Kessler-6 (K6), which includes six items related to broader mental-health symptoms (i.e., sadness, anxiety, hopelessness, restlessness, feeling everything is an effort, worthlessness). The K6 is well-validated in diverse sociocultural contexts with strong psychometric properties (Kessler et al., 2010). In the cluster randomized control trial (cRCT), we found a Cronbach α of .65.

Psychological inflexibility was measured using the Acceptance and Action Questionnaire (AAQ-II) (Bond et al., 2011). The scale itself consists of seven items related to one's appraisal of stressful or difficult situations, as well as respondent perspectives on the role of thoughts and feelings in daily life. Items are measured on a seven-point Likert scale, with higher scores

indicating a greater degree of psychological inflexibility, i.e., greater experiential avoidance.

Although the AAQ-II has been used widely in high-income contexts, there are no examples of its use in low-resource humanitarian settings. We found it to have good internal consistency within the full c-RCT ($\alpha = .77$).

Lastly, posttraumatic stress was measured using the PTSD Symptom Checklist Civilian Six (PCL-6) (Lang et al., 2012). This is an abbreviated version of the 17-item version of the PCL, a self-report inventory that measures PTSD symptom severity on a scale from 1-5. We found the PCL to have adequate internal consistency within our study ($\alpha = .72$).

Analysis

All code for the current project and a list of analyzed cases can be found at osf.io/f8vze. Our main analyses consisted of two phases. In the initial phase, we took a multilevel modeling approach (Gelman & Hill, 2006) and constructed two-level linear mixed models to test the predicted relations amongst K6, AAQ-II, and inclusion in SH+. We used the lme4 library in the R environment for all linear mixed models (Bates et al., 2015; RStudio Team, 2015). As an initial step, we ensured that the clustered structure of our data was appropriate for mixed modeling by calculating the intraclass correlation coefficient (ICC) for an unconditional mean model (i.e., random intercept with no fixed effects) with K6 as the outcome variable. After confirming there was sufficient within-cluster variability for multilevel modeling (indicated by an $ICC > 0$), we then added additional random and fixed effects of interest to the unconditional mean model using a hierarchical model building strategy. Models in this step contained a timepoint (baseline assessment, post-intervention, three-month follow-up), level-1 fixed effect predictor, and a group level-2 fixed effect predictor. We dummy-coded study condition (control = 0, treatment = 1) and modeled timepoint as a continuous variable based on the *a priori*

assumption that decreasing K6 scores over time would follow a roughly linear trajectory. We first tested if a random-intercept, random-slope model (with group modeled as a random slope) was an appropriate fit for the data. The next set of models used the resultant best fit from the previous step and then tested if using an interacted group and treatment predictor to estimate the treatment effect at each timepoint significantly improved model fit. Finally, we added AAQ-II as a level-1 predictor to the final set of models and again tested improvement in model fit. We cluster-centered the level-1 AAQ-II values (i.e., within-person mean) to isolate the level-1 time-varying effect, as well as modeled each participant's AAQ-II mean across all three timepoints as a level-2 variable to account for overall magnitude of AAQ-II score (per standard recommendations, Gelman & Hill, 2006, Wang & Maxwell, 2015). Likelihood ratio tests applied to the chi-squared distribution were used to confirm model improvement at each level of the hierarchy, with the *a priori* prediction that the best fitting model will include the AAQ-II interaction term and provide support for mediation analyses.

The next phase of analysis involved multilevel mediation analysis, again using linear mixed models, predicated on our prediction of a significant relation of treatment condition and AAQ-II with K6 scores that is tested as outlined in the previous paragraph. We conducted our analyses in line with the “2-1-1” form of multilevel mediation that has received support as a robust method of testing causal mediation within the context of similar longitudinal treatment-control group designs (e.g., Imai et al., 2010, 2011; Tofighi & Thoemmes, 2014; Zhang et al., 2016). In our 2-1-1 mediation model, the predictor of interest (treatment assignment) resided at level-2 and both the outcome (K6) and mediator (AAQ-II) resided at level-1. For our primary mediation analysis, we used the *mediation* library for R (Tingley et al., 2014), which provides functions for multilevel mediation estimation and hypothesis testing. As with mediation analysis

using simple linear regression (e.g., Hayes, 2017), the magnitude of mediation is parameterized by the indirect effect (in this case, the total effect of all predictors – the unique effect of group on K6). First, we constructed two linear mixed models, one for the mediator path (AAQ-II as an outcome of group) and one for the outcome path (K6 as an outcome of group and also as an outcome AAQ-II, with AAQ-II included as both fixed and random effect to allow for between-cluster variation of AAQ-II slopes; Tingley et al., 2014). AAQ-II was again cluster-centered at the person level, and the person-level means were included in the model. Both models included timepoint (baseline, post-treatment, follow-up) as a fixed-effect covariate. We used the previously defined mixed models to estimate the indirect effect and then constructed quasi-Bayesian 95% confidence intervals (Imai, Keele, & Tingley, 2010) around this estimate using Monte Carlo simulation (10,000 simulated draws; Preacher & Selig, 2012). Significant mediation is indicated by a confidence interval that does not contain zero. We report proportion of variance mediated and quasi-Bayesian 95% confidence intervals for significant mediations. We also constructed an additional series of mediation models that were identical to the previously described analyses but also included PCL-6 score at each timepoint as a fixed-effect covariate. These were used to determine if change in PCL-6 negated any potentially mediating properties of AAQ-II due to the possibility that a potential mediating effect of increased psychological flexibility could also align with a decrease in the negative cognitions and emotions measured by the PCL-6. Sensitivity analyses to assess for the influence of unmeasured variables in our mediation models (parameterized in terms of the correlation between residuals of the mediator and outcome regressions that comprise the mediation model, termed ρ) were conducted according to standard recommendations (Cox et al., 2013; Imai, Keele, & Yamamoto, 2010).

Finally, in the event of significant multilevel mediation, we made the *a priori* decision to decompose the longitudinal mediation effect using a simple linear regression-based mediation at each timepoint. These analyses are identical to those described above, with the exceptions of 1) the outcome and mediator models were all constructed with linear regression and thus did not contain random effects or the timepoint covariate, nor was AAQ-II transformed; and 2) three sets of mediation analyses were conducted, one for each timepoint, and in each analysis we only tested K6 and AAQ-II scores at the target timepoint. Significance testing functioned identically to multilevel mediation analysis and was used to determine which timepoint or timepoints were significantly contributing to the potentially observed longitudinal mediation effect.

Results

Participant characteristics.

We did not find significant group differences at baseline in K6, $t(692) = 0.913, p = .361, d = -.07$, or AAQ-II, $t(675) = -1.561, p = .118, d = .12$, scores. Baseline AAQ-II did not interact with group to predict K6 scores at post-treatment, $\beta = 0.094, t(640) = 1.278, p = .202, 95\% \text{ CI} = -0.051, 0.239$, or follow-up, $\beta = -0.234, t(608) = -0.298, p = .765, 95\% \text{ CI} = -0.177, 0.131$, indicating pre-treatment levels of AAQ-II conditional on group did not significantly relate to K6

Figure 1. Mean K6 and AAQ-2 scores for EUC and SH+ groups at each timepoint. Values are in the original scale of each measure. Error-bars indicate ± 1 SE. AAQ-2 = Acceptance and Action Questionnaire; EUC = Enhanced Usual Care; K6 = Kessler Psychological Distress Scale; SH+ = Self-Help Plus.

Mixed models. We found $ICC = .164$ for the unconditional mean model, indicating sufficient within-cluster (individual) variability, and thus proceeded with the next steps in our analytic plan. The addition of a random-slope for group did not significantly improve model fit, $\chi^2(2) = 3.051, p = .217$, thus all subsequent analyses only contained the random-intercept term and no other random effects. The addition of the group by timepoint interaction term to this

random-intercept model significantly improved model fit, $\chi^2(1) = 6.129, p = .013$, and thus the interaction term was carried into the next model. Addition of the AAQ-II predictor also significantly improved model fit, $\chi^2(2) = 262.7, p < .001$ (see Supplemental Materials Table S1 for model estimates with and without AAQ-II predictor). Taken together, these series of tests indicate that, in addition to the previously reported relation between the SH+ intervention and K6 scores as a function of timepoint, AAQ-II is significantly related to K6 across time as well, and thus is an appropriate candidate for mediation analyses (Tol et al., 2020).

Mediation. In the multilevel mediation framework, we found that AAQ-II significantly mediated the relationship between treatment allocation and K6, $b = -3.28$, 95% CI = -4.73, 2.01 (see Figure 2 for diagram). Further, AAQ-II mediated 81% (95% CI = 68%, 93%) of the total effect. These results imply that the reduction of K6 scores associated with allocation to the SH+ group was commuted through increased AAQ-II scores. See Supplemental Material Table S2 for full model statistics for the individual linear mixed models that constitute the overall mediation model. Including PCL-6 scores in the same mediation model as a level-1 and level-2 covariate resulted in an attenuated, but still significant, mediation effect, $b = -1.45$, 95% CI = -2.36, -0.68, with 75% proportion mediated (95% CI = 52%, 97%).

Figure 2. Path diagram for 2-1-1 multilevel mediation model with AAQ-II as a mediator of the treatment-K6 relationship. Value in parentheses represents average magnitude of mediation effect (indirect effect). Treatment allocation is coded such that positive values indicate improvement in the Self-Help Plus group. All values are expressed as unstandardized b-values. AAQ-II = Acceptance and Action Questionnaire; K6 = Kessler Psychological Distress Scale.

* $p < .05$. ^95% CI did not contain zero.

Given significant multilevel mediation by AAQ-II, we continued with decomposition of this longitudinal effect with three separate mediation analyses (one for each timepoint). As expected, AAQ-II did not significantly mediate the relationship between group and K6 at baseline, $b = -0.12$, 95% CI = -0.30, 0.02. In contrast, AAQ-II significantly mediated the group and K6 relation at both post-treatment, $b = -1.09$, 95% CI = -1.51, -0.7, proportion mediated = 33% (95% CI = 22%, 46%), and follow-up, $b = -0.84$, 95% CI = -1.27, -0.42, proportion mediated = 67% (95% CI = 0.37%, 100%). Taken together, this suggests that the mediating properties of the AAQ-II were strongest at post-treatment and continued into the follow-up timepoint but were not present at baseline. See Supplemental Material Tables S3-S5 for full model statistics for the individual linear regression models. Sensitivity analyses were conducted on the post-treatment and follow-up mediation models. Both analyses yielded sufficient evidence

that unmeasured variables had no-to-minimal influence on mediation analysis (see Supplemental Material Table S6 and Figure S1)

Discussion

Our findings suggest that psychological flexibility, as measured in this study by higher AAQ-II scores, was a strong mediator in the relationship between receiving SH+ and improved psychological distress scores. This mediation effect is more pronounced in the post-treatment assessment and attenuates by the three-month follow-up assessment. This is in line with the theoretical underpinnings of SH+, which is based in ACT and targets each of the core components of psychological flexibility. These findings are consistent with a body of extant work demonstrating the cross-cultural relevance and validity of psychological flexibility across cultures and languages. Moreover, they suggest the importance of psychological flexibility as a mechanism of change for guided self-help psychological interventions in mitigating psychological distress, specifically in low-income or humanitarian contexts. SH+ is derived from ACT and is a short-form version with lower resource intensity for delivery. These findings suggest that psychological flexibility is still a substantial element of SH+'s mechanism of change.

An important observation regarding our results is that the strongest mediating effect was found for the follow-up timepoint, yet this does not necessarily imply that psychological flexibility is most salient at this timepoint. Instead, it is likely a byproduct of continued improvement in the EUC arm of the trial while the SH+ arm maintained gains, and therefore the difference in K6 scores was reduced. In turn, this resulted in a smaller proportion that could be explained by mediation. Our results are most suggestive that increases in psychological flexibility were most influential immediately after the intervention, during the post-treatment

timepoint, as substantial mediation was achieved with a larger amount of variation between the treatment arms.

Limitations

The AAQ-II is a well-validated tool to assess change in psychological flexibility, but does not fully capture all mechanisms of change that are intervened upon in an ACT intervention (Cherry et al., 2021). Use of a more comprehensive inventory (e.g., the compACT, Francis et al., 2016) would be required to isolate the specific mechanisms mediating reduced symptoms. As with any analysis of mediating variables within an intervention context, there is also the potential of unmeasured causal variables that contribute to the measured outcome (Imai et al., 2011). Our results must be interpreted with this in mind, as it is possible that an unmeasured construct that covaries with AAQ-II score could also mediate to a significant degree. Lastly, with a pre/mid/post design, a random-slopes mediation model was not feasible given the need for more timepoints in such a model. We cannot comment on fluctuations in symptoms and AAQ-II during the course of the intervention. Ideally, mediation would be measured across multiple timepoints during any psychological intervention, but this is not pragmatic in a trial-based context. Future research might improve on psychological measurement by monitoring both symptom severity and psychological flexibility on a session-by-session basis.

Conclusions

Understanding transdiagnostic mechanisms of change for psychological interventions is essential to improve practice in humanitarian settings. If we are able to unpack interventions into their components and understand the pathways through which they achieve their intended impact on mental health and wellbeing, we are able to develop more effective and efficient interventions and training packages for non-specialist providers. Additionally, such understanding is essential

to determine which adaptations can be made to interventions when applying them in different contexts, while maintaining fidelity and focus on key mechanisms.

Declarations

Statement of Ethics

The original trial proposal was approved by the MildMay Research Ethics Committee, the Uganda National Council for Science and Technology, and the World Health Organization's Ethical Review Committee. All participants in this trial provided informed consent in compliance with the Helsinki Declaration.

Conflict of Interest Statement

We declare no competing interests.

Author Contributions Statement

Conceptualization, design, and analysis methodology were developed by DPL, WT, and SC. Primary data analysis was conducted by SC. Manuscript preparation and development were conducted by DPL, SC, WT, LA, and FB. All authors provided considerable feedback, edits, and assistance with the manuscript preparation process.

Data availability statement

Anonymized data and a data dictionary will be provided upon request for individual patient data meta-analyses after approval of a proposal and signed data access agreement (wietse.tol@sund.ku.dk; dan.lakin@jhu.edu). The analysis scripts and documentation that support the findings of this study are openly available at <https://osf.io/f8vze/> (DOI 10.17605/OSF.IO/F8VZE).

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