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Abstract

The current study investigated the feasibility of implementing a 10-week mindfulness-based intervention with a group of incarcerated adolescents. Before and after completion of the 10-week intervention, 32 participants filled out self-report questionnaires on trait mindfulness, self-regulation, and perceived stress. We hypothesized that self-reported mindfulness and self-regulation would significantly increase, and perceived stress would significantly decrease, as a result of participation in the treatment intervention. Paired *t*-tests revealed a significant decrease ($p < .05$) in perceived stress and a significant increase ($p < .001$) in healthy self-regulation. No significant differences were found on self-reported mindfulness. Results suggest that mindfulness-based interventions are feasible for incarcerated adolescents. Limitations and future research are discussed.

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Keywords

adolescents, incarcerated youth, mindfulness, self-regulation, stress reduction

Introduction

Over the past three decades, mindfulness-based interventions have shown promising results in treating a number of populations including chronic pain (Kabat-Zinn, 1982), anxiety (Kabat-Zinn et al., 1992), prison populations (Samuelson et al., 2007), and adolescent psychiatric outpatients (Biegel et al., 2009). One possible reason for mindfulness-based programs' efficacy across numerous populations is an increased ability in self-management (Baer, 2003), that is, the ability to regulate physical, mental, and emotional response. These skills may also be useful for incarcerated youth.

Criminal offending among youth is a significant problem. Approximately 2.11 million juveniles were arrested in the United States in 2008 (Puzzanchera, 2009). Although juvenile crime has been declining since the mid-1990s, violent crime, such as homicide and robbery, accelerated between 2001 and 2005 (Federal Bureau of Investigation, 2005). Further, Williams et al. (2008) suggest that approximately 10–12% of youth offenders continue to re-offend into adulthood while Snyder and Sickmund (2006) contend the percentage to be significantly higher (25%).

Thus, it is important that treatment interventions for incarcerated youth target the constructs necessary to deter juvenile offending. For example, Vitacco et al. (2002) found that high levels of impulsiveness were associated with a higher likeliness to recidivate and longer incarceration periods among male adjudicated youth. Wills et al. (2006) found that self-regulation was inversely correlated with substance use and Miller and Byrnes (2001) found self-regulation to be negatively associated with decision-making and academic competency in adolescents. Thus, self-regulation constructs such as impulsiveness and decision-making may be related to juvenile delinquency and should be targeted by treatment interventions.

Mindfulness meditation practices may be effective in targeting the above undesirable behaviours. These programs, which emphasize nonjudgmental awareness and acceptance of mental content in the present moment (Kabat-Zinn, 1990, 2003), have been shown to facilitate rehabilitation for incarcerated adults by increasing psychological well-being (Alexander et al., 2003; Hawkins, 2003; Samuelson et al., 2007) and reducing recidivism (Alexander et al., 2003; Bleick and Abrams, 1987; Rainforth et al., 2003).

Literature review

The majority of the empirical research on mindfulness in different populations has used mindfulness-based stress reduction (MBSR) (Kabat-Zinn, 1990). Briefly, MBSR is an 8-week intervention where participants meet once a week for approximately two and half hours and one day long retreat. Skills taught included focusing on the breath in sitting meditation, the body scan meditation while lying down, and Hatha yoga postures (Kabat-Zinn, 1990). Although documented research is not plentiful,

the literature shows mindfulness interventions in ethnically diverse populations, prison populations, and adolescent populations, as well as their associations with self-regulation and stress.

Diverse populations

The MBSR intervention has scarcely been researched within ethnically diverse populations. One study, however, investigated the effect of MBSR on an inner city diverse population (Roth and Robbins, 2004). Roth and Robbins (2004) examined the effect of the MBSR program on 68 predominately Hispanic women ($n = 56$) and men ($n = 12$). A comparison group of 18 Hispanic women served as controls to the treatment intervention.

Results revealed that five of the eight scales from the Short Form-36 (SF-36) significantly changed from pretest to posttest in treatment participants. No significant differences were found with control participants (Roth and Robbins, 2004). Significant results were found in the following scales: general health, role-physical, vitality, social functioning, and role-emotional. Sleep quality and family harmony were also measured before and after participation in the intervention; however results showed no significant differences. Although this study shows promising results, there are some major limitations worth mentioning. First, the control group is comprised completely of women and is approximately four times smaller than the treatment group. This contributes to a weak methodological approach. Second, the overall study was primarily women, which lends merit to the question of whether or not similar results would be found in inner city Hispanic male population. Surely, future research is necessary to answer such questions.

Prison populations

MBSR has also been evaluated in prisoners. Samuelson et al. (2007) implemented the MBSR program in six Massachusetts prisons from 1992 to 1996. The MBSR program was administered to 1350 inmates in one women's prison and five men's prisons. Samuelson et al. (2007) reported several modifications of the program that allowed it to be implemented in a correctional setting. For example, some prisons allotted a private room designated for MBSR practice alone, while others designated large open spaces concurrently being used by other inmates. Courses were sometimes compressed from the original 8-week length, to 6-week programs with shorter sessions. The intensive retreat was never allowed at any prison site. Still, the MBSR intervention proved to have a high completion rate of 69% (Samuelson et al., 2007), suggesting feasibility within correctional populations.

Results showed statistically significant reductions ($p = .0001$), 9.2% for women and 7% for men, on Cook and Medley Hostility scales at all prison sites. Increased scores from pretest to posttest ($p = .006$), 8.3% for women and 3.8% for men, on the Rosenberg Self-esteem Scales were found at all program sites. The most dramatic reduction was found on the Profile of Mood States Scale, which dropped approximately 38% for women and 29% in men ($p = .0001$). Although strong

results were found, critical evaluation is necessary. Samuelson et al. (2007) did not have a control group that suggested such improvements were due specifically to the MBSR intervention. This suggests that improved research designs are still necessary in order to credit MBSR with the positive results from the above study.

Adolescent populations

To date, very few empirical studies have investigated the effect of mindfulness programs on adolescent populations. Two feasibility studies were found assessing the impact of MBSR with adolescent populations (Sibinga et al., 2008; Wall, 2005). Sibinga et al. (2008) explored the feasibility of the MBSR intervention with 11 HIV-infected African American adolescents using brief informal interviews. Results showed that the MBSR intervention was feasible with HIV-infected youth given positive participant feedback after the completion of the course (Sibinga et al., 2008). In another pilot study investigating an MBSR-like intervention with adolescents, Wall (2005) combined Tai Chi practices and MBSR with middle school aged adolescents in a Boston area public school. Qualitative feedback from participants suggested improved sleep, well-being, relaxation, and reduced reactivity; however, participants 'were noncommittal about continuing' (Wall, 2005: 236).

In contrast to the two pilot studies above, one randomized clinical trial was found that employed MBSR with adolescent psychiatric outpatients (Biegel et al., 2009). Biegel et al. (2009) randomly assigned 102 adolescent psychiatric outpatients to either MBSR or a waitlist-controlled group. The MBSR intervention was modified to fit adolescent needs in two ways. First, at home mindfulness practice time was reduced from 45 minutes to 20–35 minutes, and, second, presentations and discussion topics during classes focused primarily on issues related to adolescence. Participants ranged in age from 14–18 and were primarily female. Study measures were obtained at pretest, posttest, and 3-month follow-up. The 10-item perceived stress scale (PSS-10), the State and Trait Anxiety Inventory (STAI), the 10-item Rosenberg Self-esteem Scale (SES), and six of the nine subscales of the Hopkins Symptom Checklist 90 Revised (SCL-90-R) served as self-report measures at all three assessment points.

Approximately 60 per cent of the participants from the intent to treat sample completed pretest and posttest assessment points. Results revealed that, relative to controls, MBSR participants showed significant decreases over time in state and trait anxiety ($p < .05$), perceived stress ($p < .05$), and four of the six psychopathology indicators assessed by the SCL-90-R ($p < .05$). Self-esteem also significantly increased within participants receiving the MBSR intervention ($p < .05$). Relative to controls, MBSR participants showed significant improvements in GAF scores over time from pretest to posttest and pretest to follow-up ($p < .0001$).

Self-regulation, stress and adolescence

Self-regulation and stress are particularly important to the well-being of adolescents. Self-regulation has been inversely associated with numerous behavioral well-being factors in adolescence including substance use (Wills et al., 1995; Wills et al.,

2002; Wills et al., 2006), sexual risk-taking (Raffaelli and Crockett, 2003), academic decision-making and competency (Miller and Byrnes, 2001), and juvenile delinquency (Vitacco et al., 2002). Further, the original research on the perceived stress scale (Cohen et al., 1983) and its condensed 10-item version (Cohen and Williamson, 1988) found that personal autonomy was inversely associated with perceived stress. That is, as personal autonomy increased, perceived stress decreased in the population under study. Given that autonomy is almost stripped from incarcerated youth upon admittance to juvenile hall, stress may play an important role in the well-being of incarcerated youth. Therefore, this study investigated whether self-regulation, perceived stress, and mindfulness would significantly change from pretest to posttest over a 10-week period in a preliminary group of 32 incarcerated adolescent males.

Method

Given the above literature on MBSR in diverse populations, the focus of this study was to test the feasibility of implementing a mindfulness-based intervention with a group of incarcerated adolescents and measure its effect on self-regulation, mindfulness, and stress. The Mind Body Awareness (MBA) project's 10-week mindfulness-based intervention was chosen due to its specific focus and clinical expertise for incarcerated youth. The MBA project is a San Francisco Bay Area non-profit organization specializing in teaching mindfulness skills to incarcerated youth. The well researched MBSR (Kabat-Zinn, 1990) was not chosen for the current investigation because of institutional limitations in its full implementation (e.g. two and half hours were not permitted for class time, there was no opportunity for an intensive retreat, and no suitable space to practice physical yoga postures).

The treatment intervention. The MBA project's adapted mindfulness-based intervention is a 10-session, once per week intervention with classes lasting approximately one hour in duration. Each class consisted of formal sitting mindfulness meditation (Vipassana-based), experiential activities, group process, and discussion topics. The class structure consisted of a brief opening meditation, a check-in (in which participants expressed their present-moment emotional feelings), a discussion topic facilitated by the class instructor (e.g. empathy, forgiveness, impulse regulation), an experiential exercise (e.g. forgiveness meditation, stand if empathy exercise), and a formal mindfulness meditation (usually 10–15 minutes in duration).

There were 10 discussion topics, one for each class, which guided the group process and experiential exercises and included: 1) basic goodness, 2) mindfulness, 3) active listening, 4) impulse regulation, 5) emotional intelligence, 6) empathy, 7) forgiveness, 8) transforming negative core beliefs, 9) cause and effect, and 10) interpersonal relationships. Although a discussion of each topic and their coinciding experiential activities is beyond the scope of this article, the reader is referred to the first author's doctoral dissertation (Himmelstein, 2009) for a more in-depth review.

Between each class, participants were encouraged to practice the concepts of the specific topics and to formally meditate as much as possible, although no requirement was made. Mindfulness records, in which participants could record the

amount of time they spent formally meditating, were passed out and collected at the start of each class in order to track the time participants spent meditating. Unfortunately, shortly after our research began, the juvenile hall units in which the intervention was offered banned the use of pencils due to a violent incident. Participants could only use pencils to fill out mindfulness records at specific times of the week and under the strictest of staff supervision. This diminished the integrity of the data we were hoping to collect and the mindfulness record data were deemed uncollectable.

Differences between the MBA and MBSR interventions. As mentioned earlier, the MBA intervention was a 10-week, rather than 8-week course, and sessions were one hour, rather than two and a half hours. Additionally, the MBA intervention did not include Hatha Yoga practice, an intensive retreat component, or a requirement of meditating 45 minutes a day between classes. Future research with the MBA intervention may include longer class periods, greater frequency of classes throughout the week, yoga practice, and intensive retreats, as the Executive Director of the organization suggests (C. McKenna, personal communication, December 13, 2010).

Research hypotheses. Four research hypotheses were tested for the current study: (1) the MBA project's mindfulness-based intervention would be a feasible treatment intervention, (2) self regulation results would show a significant increase from pretest to posttest, (3) perceived stress results would show a significant decrease from pretest to posttest, and (4) mindfulness results would show a significant increase from pretest to posttest.

Participants and procedure

Thirty-two adolescent inmates incarcerated in two units of a juvenile hall located in the San Francisco Bay Area participated in this study. Participants were recruited by unit staff based on anticipated duration of incarceration in the juvenile hall. The ethics of this study underwent a full review process by the research ethics committee at the Institute of Transpersonal Psychology, the educational institution overseeing this research. Further, the presiding juvenile court judge overseeing the juvenile hall in which this study took place approved the current research. Therefore, the presiding juvenile judge signed informed consent because the participants were wards of the court and not in the custody of their primary caregivers, who normally would sign. In addition to informed consent, the incarcerated juvenile participants signed assent forms prior to participation in the study. We felt it was important to inform the research participants that it was entirely optional to participate in the study and that at any time if they decided they did not want their data collected, they had the right to refuse to fill out the assessment packets with no penalty of being removed from the class. At the start of each group, the participants were informed of the nature of the research project, of the fact that their participation was entirely voluntary, and that compensation in the form of a course certificate and chocolate bars would be given as incentives. Furthermore, we had no access to participant files and could not contact the primary caregivers of the participants for parental consent.

Two mindfulness meditation groups were conducted in two adjacent units in the juvenile correctional facility. Classes were conducted once a week for one hour's duration, with classes taught on the same day each week. In total, two 10-week cycles were completed to gather participant data for this study.

Study measures

Before and after each 10-week course, participants completed three paper and pencil self-report assessments. In order to minimize demand characteristics, pretest and posttest self-report questionnaire packets were administered by unit staff, and not in the presence of the treatment facilitator.

Perceived Stress Scale 10. The Perceived Stress Scale (PSS) (Cohen et al., 1983) is a brief, simple to administer self-report scale that explores appraisal of stressful situations in the prior month of the participant's daily life. A 5-point Likert rating scale (0 = Never, 4 = Very Often) is used to answer each question. Questions are intentionally general and not specific to any sub-population. The PSS was designed for people with at least a junior high school education. The original version (Cohen et al., 1983) had 14 questions; however, the PSS-10 (Cohen and Williamson, 1988), a 10-question condensed version, was shown to have a higher internal reliability (Cronbach's alpha, $\alpha = .78$) and tighter factor structure than did the original PSS. Thus, the PSS-10 was used in this study due to its higher validity and quality, as well as its reduced time to complete. Six out of 10 questions directly measure perceived stress, while four questions indirectly measure perceived stress. Scores for indirect measurements of perceived stress are reverse-scored. Thus, higher scores on the PSS-10 indicate higher perceived stress. The internal reliability for the sample in this study was sufficient (Cronbach's alpha, $\alpha = .77$).

Mindfulness Attention Awareness Scale. The Mindfulness Attention Awareness Scale (MAAS) (Brown and Ryan, 2003) is a 15-item self-report assessment measuring presence and absence of attention and awareness to experience in the present moment. The MAAS assesses mindfulness in general terms, interpersonal communication, thought process, and emotional and physical states. Scores are calculated from the mean of the sum of a 6-point Likert rating scale. Because the MAAS takes an indirect approach to measuring mindfulness – measuring what it is not – a higher score indicates a higher measure of mindfulness. The MAAS was selected based on research indicating a high internal consistency and test-retest reliability on samples of college students and adults (Brown and Ryan, 2003). The internal consistency for the MAAS in this study was also high (Cronbach's alpha, $\alpha = .93$).

Healthy Self-Regulation Scale. The Healthy Self-Regulation Scale (HSR) (West, 2008) is a set of items that originated as a subscale of the Mindfulness Thinking and Acting Scale for Adolescence (MTASA). The MTASA is an adolescent mindfulness measure developed out of West's (2008) dissertation. West suggests that these 12 items may be used as an independent, self-report measure (A. West, personal communication, March 9, 2010) and are both high in reliability (consistency) and validity (the questions measure what they are intended to measure). All items are answered on 6-point Likert rating scale. Higher scores on 9 out of 12 items represent

higher ability to self-regulate, while three items are reversed scored. In addition to this instrument's strong internal consistency and positive correlations with wellness indicators, West (2008) found the HSR to have strong test-retest reliability (0.84). This measure showed a high internal consistency in this study as well (Cronbach's alpha, $\alpha = .81$). The HSR items were chosen for use as a scale in this study based on the measure's short length, readability, and hypothesized relationship to healthy self-regulation.

Data analysis. A two-factor (Unit X Time Cycle) analysis of variance (ANOVA)¹ was conducted with pretest measures of the dependent variables to assess if there were significant differences between the two units and 10-week cycles. The data was then collapsed into one data set and Paired *t*-tests were conducted in order to examine if there were significant within-groups differences between pretest and posttest data for each dependent variable.

Results

Thirty two participants signed assent forms, agreed to participate in this study, and were included in analysis. In addition to the 32 participants included in the analysis of this study, 15 participants who wished to participate in the program initially signed assent forms, but were released from juvenile hall before the completion of the 10-week intervention. Thus, their demographic and assessment data was not included in the analyses of this study.

All 32 participants completed the full 10-week mindfulness-based intervention. One participant failed to complete a posttest PSS-10, another participant failed to complete a posttest HSR, and another participant failed to complete a pretest MAAS. Incomplete single assessments (for example just the MAAS and not the other assessments) were excluded from data analysis. Therefore, the total number of completed pretest and posttest questionnaires ($n = 31$) was one less than the total number of participants. Participants were 100% male ($n = 32$), ranged in age from 14-18 ($M = 16.75$) and identified as Latino ($n = 19$), African-American ($n = 5$), Caucasian-American ($n = 3$), Pacific Islander ($n = 3$), and mixed race descent ($n = 2$).

The two-factor ANOVA revealed no significant differences between the unit X cycle analysis for the MAAS, the PSS-10, or the HSR (all p 's $> .05$).² Although mean scores of the MAAS did increase from pretest ($M = 59.6$) to posttest ($M = 63$), this increase was not statistically significant, at $t(30) = -1.465$, $p > .05$,³ two-tailed. Mean scores of the PSS-10 decreased from pretest ($M = 21$) to posttest ($M = 18.7$) and were significant, at $t(30) = 2.418$, $p < .05$, two-tailed. Finally, mean scores of the HSR increased from pretest ($M = 43.6$) to posttest ($M = 48.7$) and were also significant, at $t(30) = -4.731$, $p < .001$, two-tailed (see Table 1 for a summary of results).

Alongside the above quantitative results, qualitative data was collected from volunteer participants immediately following the completion of the 10-week treatment intervention via semi-structured interviews. One participant commented that the mindfulness practice helped him reduce his stress when going to a court date; 'I meditated, tried to forget a little bit about it [court], and it just helped. It wouldn't make me forget about it, but it helped me'. Another participant described feeling

Table 1. Differences in mean scores pre- and post-intervention

Measure	Pre-intervention		Post-intervention		<i>t</i> (30)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
MAAS	59.6	15.6	63	9.6	-1.465
PSS	21	5.5	18.7	6.8	2.418*
HSR	43.6	8.6	48.7	10.04	-4.731**

Note: * $p < .05$, ** $p < .001$.

more in control of himself as a result of the mindfulness practice; 'I feel like I can control myself. I wouldn't say like a lot more, but I feel like I can control myself a little more in situations, like when it comes to staff or other youth here'. Finally, a number of participants commented on how they thought the program was positive and educational for their population. One participant discussed the program as a whole being helpful for him; 'It really opened a different sector for me, such as seeing things in a different perspective, how to analyze it, just see it from different points of view. It really helped me out'. Another participant felt the program should be taken by other youth inmates; 'I say everybody should right here just try it. Every youth in here, it's gonna help them a lot... Maybe to clear their mind, open their mind'.

Discussion

This study extends and supports previous research (e.g. Biegel et al., 2009; Roth & Robbins, 2004) demonstrating that mindfulness-based interventions are feasible treatments for ethnically diverse and adolescent populations. The results confirmed our first hypothesis that the MBA intervention would be feasible with a group of incarcerated adolescents. All 32 participants who assented to treatment completed the full 10-week intervention. Although 15 participants could not complete the MBA intervention due to release from the correctional facility, approximately 60 per cent of our intent to treat group completed the program. This rate is comparable to the retention rate of Biegel et al. (2009) (approximately 60%), Roth and Robbins (2004) (66%), Roth and Creaser (1997) (60%), and Samuelson et al. (2007) (69%).] Roth and Creaser (1997) (60%), and Samuelson et al. (2007) (69%).

Furthermore, qualitative data collected immediately following the intervention noted above (see Himmelstein, 2009 for an in-depth review) suggested that most participants had an open and accepting attitude toward the treatment intervention and that their experiences in the program were meaningful, educational, and beneficial.

The results also confirmed our second and third hypotheses: that self-regulation and perceived stress significantly changed from pretest to posttest in psychological enhancing directions. However, our fourth hypothesis was not confirmed: mindfulness scores did not significantly increase from pretest to posttesting. Mindfulness might not have changed significantly because of the lack of mindfulness training

between class sessions, or due to the fact that the curriculum of the intervention does not sufficiently increase mindfulness.

The feasibility of the MBA project's intervention should be considered within the context of the juvenile hall setting. As noted above, some minor setbacks occurred in the data collection and changes to the research design are worth mentioning. Forty-seven participants initially started the MBA intervention, but 15 were not able to complete the intervention. We were unable to prescreen participants for exact length of stay in the facility due to data access limitations. Although this represents an attrition rate of 32 per cent, this should not undermine the feasibility of the intervention. Oftentimes, participants will get released from juvenile hall part-way through an intervention and to request that they stay for the sake of the research would be unethical and downright inhuman. Thus, attrition rates in correctional settings may be misleading. Furthermore, our attempts to collect mindfulness records, which might have yielded meaningful data and might have contributed to more elaborate statistical analyses (e.g. hi/low mindfulness practice X dependent variable outcome) were thwarted by circumstances. It was beyond our foresight to plan for the violent events that catalyzed a restriction of pencil use by the participants in this study and we wish to share this experience with other researchers working in correctional settings. Future researchers should anticipate such setbacks and consider how they might affect their overall research project. Incarcerated youth have been exposed to far more violent traumatic events than their non-incarcerated adolescent counterparts (Steiner et., 1997; Wood et al., 2002), and the violent nature of the correctional environment has been well documented (Haney, 2006). Therefore, researchers must realize that they might not be able to implement an intervention that could easily be implemented in a non-incarcerated population.

In addition, the recent rise of adapted mindfulness-based interventions and their possible use as adjunctive treatments support the feasibility of the MBA intervention. Wall (2005) adapted the MBSR intervention by combining it with Tai Chi techniques in a group of middle school students. Biegel et al. (2009) adapted the discussion portion and meditation requirements of the MBSR intervention so that it conformed to the needs of a psychiatric adolescent outpatient population. Although the MBA intervention's curriculum is not an offshoot of the premier MBSR intervention, it still supports the notion that mindfulness programs can be adapted to fit the specific needs of the populations they serve. Modified interventions may be helpful in establishing mindfulness-based interventions as adjunct treatments to more intensive services such as individual psychotherapy. For example, Baer (2003) suggests that one of the mechanisms operative in mindfulness is an increased ability to self manage, a finding that is preliminarily supported by this study's results of self-regulation. Mindfulness training coupled with individual psychotherapy may increase an adolescent's ability to self-regulate (a treatment goal often established in some form or another in most psychotherapy with adolescents). In turn, higher self regulation skills might enrich the experience of psychotherapy by allowing the adolescent to explore deeper issues such as trauma and family relationships.

Finally, mindfulness-based interventions are relatively inexpensive to implement in correctional settings, making these interventions all the more feasible. The MBA

intervention served approximately 8–10 participants per juvenile hall unit in each 10-week cycle. This is much less expensive than say, training the mental health practitioners in correctional settings and having them teach mindfulness skills to their individual or even group clients. Community based programs offering mindfulness training, such as the MBA project, can collaborate with correctional institutions and provide mindfulness training and adjunctive mental health services to many youth that mental health practitioners might not reach regularly (possibly because of case-load space). Thus, the use of adapted mindfulness-based interventions for special populations such as incarcerated youth merits public attention.

Limitations

Although this study shows promising results, some limitations are worth consideration. First, given the pilot nature of this study, no control group was used to validate the results from the treatment group. Therefore, the significant differences that did occur might be due to some factor other than participating in the treatment intervention.

Second, the small sample size contributed to a decreased power that may have been stronger had there been more participants in this study. Cohen (2008) suggests that statistical power is a function of sample size, alpha level, and effect size, with a smaller sample size generally contributing to a weaker power. Thus, the small sample size in this study limits the power of the results.

Third, the 12-item HSR scale was used with the knowledge that it has not been validated as a standalone self-report measure. The HSR was a subscale of the original MTASA (West, 2008), and emerged as having good psychometric qualities as related to the MTASA as a full scale. Because the HSR is being pursued for validation as a standalone self-regulation scale (A. West, personal communication, March 9, 2010), is particularly short in length (reducing the overall time of the test battery), and had high internal consistency for this group (Cronbach's alpha, $\alpha = .81$), it was chosen for this study.

Fourth, it is unclear what the operative mechanisms of change were in the treatment intervention. That is, given that the treatment intervention was a comprehensive intervention including mindfulness training, experiential activities, didactic learning, and group process all under the auspices of a skilled facilitator, we cannot confirm that the results of this study are due to mindfulness training. It could be, for example, that the interactions and relationships the facilitator (first author) had with the participants influenced the outcomes of the self-report questionnaires.

Future research

Given the limitations of this study, future research is necessary to establish the MBA intervention and others like it as empirically supported. First, more advanced quantitative research designs should be implemented to investigate the MBA intervention. The use of a randomly controlled research design with an adequate sample

size would sufficiently advance the efficacy and power of the results of future research.

Second, the use of systematic qualitative methods to investigate the impact of the program on the lives of the participants would enhance research efficacy. The experiences of the participants and the way they respond to such a program might validate its feasibility. Continued qualitative research could work as adjunctive or even a primary data set to quantitative data and contribute to even more advanced mixed method designs (e.g. Himelstein, 2009). Qualitative data might also capture powerful feedback from participants on how to improve the intervention for a specific population such as incarcerated youth.

Third, further research should investigate this intervention's efficacy across different facilitators, and altered curriculums (e.g. more meditation, less didactic learning) to provide insight on the possible mechanisms of change operative in the MBA and other adapted mindfulness-based interventions. This would enhance the state of the field by providing clinicians and researchers the most important mechanisms that would promote rehabilitation in specific populations.

Conclusion

Although there are limitations to this study, the results suggest that the MBA program is a promising intervention for incarcerated adolescents. This study suggests that mindfulness programs can be applied to underserved adolescent and ethnically diverse populations. Importantly, the increased self-regulation and decreased perceived stress that can result from such a program might enable higher psychological functioning in incarcerated youth. Thus, staff at juvenile correctional facilities, policy makers, and mindfulness intervention experts may consider mindfulness interventions as another possibility for primary or adjunctive treatment with incarcerated youth. Randomised clinical designs may assist in establishing mindfulness interventions as empirically validated treatments for juvenile offenders. Continued research in the field of mindfulness may reveal the operative mechanisms that facilitate change within mindfulness-based interventions. Despite the fact that much work remains to be done, it is exciting that three decades of empirical research with mindfulness programs show that they are feasible treatment approaches in wide-spread and diverse populations.

Notes

1. The pretest scores on the MAAS, the HSR, and the PSS were analysed to make sure there were no significant differences between the participants in cycle 1 and 2, and unit 1 and 2. With no significant differences between the groups, they could all be merged into one large group for statistical analysis.
2. A *p* value of .05 suggests that there was only a 5 per cent chance the results found were due to coincidence.
3. A *p* value of .05 suggests that there was only a 5 per cent chance these results were due to coincidence, and 95 per cent chance the results were due to the treatment intervention. Further, a *p* value of .001 suggests that there was only a 1 per cent chance the results were

due to coincidence, and 99 per cent chance the results were due to the treatment intervention.

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