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# Examining Positive Psychological Constructs in the Context of 12-Step Recovery

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Examining Positive Psychological Constructs  
in the Context of 12-Step Recovery

by

Danette Beitra

A Dissertation Presented to the School of Psychology  
of Nova Southeastern University  
in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy

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2015

This dissertation was submitted by Danette Beitra under the direction of the Chairperson of the dissertation committee listed below. It was submitted to the School of Psychology and approved in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Clinical Psychology at Nova Southeastern University.

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Date of Final Approval

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## Table of Contents

List of Tables.....	vi
List of Figures.....	viii
Abstract.....	1
Introduction.....	3
Effectiveness of 12-Step Organizations and Quality of Life Outcomes.....	4
Positive Psychology and Recovery.....	5
The Empirical Literature.....	6
Gratitude.....	7
Defining Gratitude.....	7
The Emotion of Gratitude.....	7
Measuring Gratitude.....	8
Empirical Examination of Gratitude.....	9
Gratitude and 12-Step Recovery.....	11
Future Directions and Implications of Gratitude.....	12
Meaning in Life.....	12
Defining Meaning in Life.....	12
Measuring Meaning in Life.....	13
Empirical Examination of Meaning in Life.....	15
Meaning in Life and 12-Step Recovery.....	18
Future Directions and Implications of Meaning in Life.....	20
Life Satisfaction.....	20
Defining Life Satisfaction.....	20
Measuring Life Satisfaction.....	21
Empirical Examination of Life Satisfaction.....	21
Life Satisfaction and 12-Step Recovery.....	23
Future Directions and Implications of Life Satisfaction.....	24
Personal Growth.....	25
Defining Personal Growth.....	25
Measuring Personal Growth.....	26
Empirical Examination of Personal Growth.....	26
Personal Growth and 12-Step Recovery.....	27
Future Directions and Implications of Personal Growth.....	29
Integrative Conclusions.....	29
Research Questions.....	32
Methodological Framework.....	33
Contribution of the Present Study.....	37
Proposed Analyses.....	38
Method.....	41
Procedure.....	41
Participants.....	41

Measures.....	41
Results.....	46
Overview.....	46
Refinement of the Rating Scale.....	47
Comparison of Model Fit.....	50
Examination of Item and Person Fit.....	51
Examination of Dimensionality.....	51
Exploring Optimum Measurement Modeling.....	52
Relative Contribution of Predictors to Estimated Factor Scores.....	53
Discussion.....	57
Measurement Refinement.....	58
Recovery-related Predictors.....	62
Strengths.....	65
Limitations.....	65
Conclusions.....	66
References.....	69
Tables.....	83
Figures.....	105
Appendices.....	106
Appendix A. Gratitude Questionnaire-6 (GQ-6).....	106
Appendix B. Meaning in Life Questionnaire (MLQ).....	107
Appendix C. Satisfaction with Life Scale (SWLS).....	109
Appendix D. Personal Growth Initiative Scale (PGIS).....	110

## List of Tables

Table 1.	Assessment Instruments
Table 2.	NA 12-Steps
Table 3.	Positive Psychology Constructs
Table 4.	Descriptive Statistics for Gratitude Questionnaire (GQ-6), Meaning in Life Questionnaire (MLQ), Satisfaction with Life Scale (SWLS), and Personal Growth Initiative Scale (PGIS)
Table 5.	Summary of Unrefined Rating Scale Performance - Gratitude Questionnaire (GQ-6)
Table 6.	Summary of Unrefined Rating Scale Performance – Satisfaction with Life Scale (SWLS)
Table 7.	Summary of Unrefined Rating Scale Performance – Personal Growth Initiative Scale (PGIS)
Table 8.	Refined Response Options: Gratitude Questionnaire (GQ – 6)
Table 9.	Refined Response Options: Satisfaction with Life Scale (SWLS)
Table 10.	Refined Response Options: Personal Growth Initiative Scale (PGIS)
Table 11.	Item Infit and Outfit for Dropped Items
Table 12.	Parameter Estimates for Each Item from the Rotated Slope Matrix
Table 13.	Item Content
Table 14.	Inter-Correlations of the Recovery-Related Predictors (with Means and Standard Deviations)
Table 15.	Factor Inter-Correlations
Table 16.	Hierarchical Multiple Regression Predicting Estimated Factor Scores for Gratitude from Demographic, Person-Level Covariates, and Recovery-Related Predictors
Table 17.	Hierarchical Multiple Regression Predicting Estimated Factor Scores for Life Satisfaction from Demographic, Person-Level Covariates, and Recovery-Related Predictors

Table 18. Hierarchical Multiple Regression Predicting Estimated Factor Scores for Personal Growth from Demographic, Person-Level Covariates, and Recovery-Related Predictors

Table 19. Unique Effects from Hierarchical Regression Models Predicting Estimated Factor Scores for Gratitude, Life Satisfaction, and Personal Growth



## **List of Figures**

Figure 1. EFA Scree Plot and Variance Explained

## Abstract

Twelve step organizations such as Alcoholics Anonymous and Narcotics Anonymous are free, community-based fellowships. Such organizations are the most widely sought recovery management options, surpassing professional treatment. The emerging evidence base suggests that involvement in such organizations is associated with positive substance-related outcomes (e.g., abstinence). Relatively speaking, however, far less is known about whether or not involvement is associated with other meaningful psychosocial constructs. The current study examined gratitude, meaning in life, life satisfaction, personal growth, and various other recovery and psychosocial constructs in a sample of self-identified NA members ( $N = 128$ ) from 26 U.S. states, ranging in age from 22 to 64 years. The primary aim of the present study was to psychometrically evaluate and refine four distinct positive psychology instruments (i.e., Gratitude Questionnaire (GQ – 6), Meaning in Life Scale (MLQ), Satisfaction With Life Scale (SWLS), Personal Growth Initiative Scale (PGIS)). The current study contained three phases. First, the psychometric properties of each instrument were examined within an Item Response Theory measurement framework. The Rating Scale Model was used to evaluate the each instrument using WINSTEPS 3.74.01. With the exception of the Meaning in Life Questionnaire (which did not conform to an IRT measurement model), each instrument was iteratively refined based on statistical and clinical considerations, resulting in the collapse of response options and the removal of poorly fitting items. These refinements improved the psychometric properties of each instrument, resulting in a more reliable, accurate, and efficient way to measure gratitude, life satisfaction, and personal growth in clinical samples. Second, items from the GQ – 6, SWLS, and PGIS were examined concurrently using the PROC IRT procedure in SAS to explore whether the constructs were distinct from one another. Results provide support that gratitude, life satisfaction, and personal growth are unique and distinct constructs. Last, the study examined

several recovery-related correlates of gratitude, life satisfaction, and personal growth.

Hierarchical regression models assessed whether abstinence duration and other recovery-related variables accounted for significant incremental variance in gratitude, life satisfaction, and personal growth, over and above several covariates. As a block, abstinence duration and recovery predictors accounted for significant incremental variance in all of the constructs. These data suggest ongoing recovery involvement in 12-step organizations may be associated with positive outcomes beyond abstinence. Limitations and directions for future research are discussed.

*Keywords:* Narcotics Anonymous, 12-step recovery, measurement, IRT, instrument refinement, gratitude, meaning in life, life satisfaction, personal growth

## Examining Positive Psychological Constructs in the Context of 12-Step Recovery

Chronic substance use and dependence is a problem of great public health significance. Annual prevalence estimates for substance use disorders (based on criteria established by the Diagnostic and Statistical Manual of Mental Disorders, [DSM-IV; American Psychiatric Association, 1994]) for adults living in the United States range between 3.8% and 9.4%, while lifetime prevalence estimates are approximately 30% for alcohol (Hasin, Stinson, Ogburn, & Grant, 2007) and 10% for other drugs (Compton, Thomas, Stinson, & Grant, 2007). In addition, substance use accounts for \$400 billion in economic costs and 500,000 deaths annually (Horgan, Skwara, & Strickler, 2001). In 2008, this amounted to nearly 22.2 million individuals (age 12 or older) who were living in the United States with a substance use disorder.

In addition to professional services for the treatment of substance use disorders, community-based, ongoing recovery options, such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA) have been available to individuals since the 1930s and 1950s, respectively. These free, community based programs, known as 12-step organizations are based on the concept of self-help—where non-professional peers are devoted to assisting others who have similar problems (Humphreys et al., 2004). The universal self-help features of these organizations include a shared problem among members, non-professional self-directed leadership, lack of fees, voluntary nature of participation, norm of reciprocal helping, and inclusion of at least some personal change goals (Humphreys et al., 2004). In addition, these organizations support the disease model of addiction and abstinence-based recovery, an optional spiritual approach, and promote the sharing of one's experiences with other members (Humphreys, 2004).

A review of the literature suggests that these 12-step organizations are the most commonly sought recovery option for individuals with substance use disorders (Compton et al., 2007; Humphreys, et al., 2004; Room & Greenfield, 1993). However, our understanding of 12-step programs is limited to empirical literature that focuses on short-term abstinence in AA (Humphreys, 2004; Peyrot, 1985; Room & Greenfield, 1993).

### *Effectiveness of 12-Step Organizations and Quality of Life Outcomes*

It has been speculated that 12-step organizations offer more in terms of recovery than simply abstinence (Laudet, 2008). A review of the 12-step empirical literature utilizing retrospective correlational data suggests an association between attendance and affiliation at 12-step meetings and abstinence (Weiss et al., 2005), decreased rates of psychopathology and increased self-esteem (Christo & Sutton, 1994), quality of life satisfaction and reduced stress (Laudet & White, 2008), active coping resources and expanded friendship networks (Humphreys, Mankowski, Moos, & Finney, 1999), and fewer health care costs than those who choose professional treatment services (Humphreys & Moos, 2001; Humphreys & Moos, 2007). In addition, the degree of involvement in working the 12-steps has been positively associated with both abstinence and an increased meaning in life (Montgomery et al., 1995).

The emerging support for the psychosocial outcomes beyond abstinence effects have largely focused on members in the first year of recovery, however, research suggests that these positive psychosocial outcomes develop over time (Dennis et al., 2007). Studies have suggested the benefits of 12-step affiliation on quality of life outcomes, such as social support, spirituality, and reducing stress, for longer periods of recovery (Laudet & White, 2008). According to 12-step literature, the process of attaining complete abstinence by active membership (e.g., working the steps, engaging in spiritual practices) is guided by a notable focus on the resultant

psychological changes of working the 12-steps. In spite of evidence that 12-step organizations facilitate psychological improvement, and clinical studies that reveal that long-term recovering individuals seem above average in psychological health (Johnson, 1994), research on the components of meaningful recovery in members of NA is limited. In order to fill this important gap in the literature, the present study will explore facets of meaningful recovery that support continuous abstinence in 12-step organizations, such as positive psychological traits, to provide a greater understanding of the theory of 12-step recovery.

### *Positive Psychology and Recovery*

Positive psychology is one unexplored arena that may help to provide more information on successful recovery from substance use disorders. Although a relatively new area of study, core constructs discussed in the positive psychology literature are compatible with constructs discussed by members of 12-step organizations—including NA (DeLucia, Bergman, Formoso, & Bruder, 2015). Positive psychology is defined as the study of human strengths, including concepts such as subjective well-being, gratitude, having meaning and purpose in life, life satisfaction, optimal functioning, personal growth, and psychological well-being (Duckworth, Steen, & Seligman, 2005; Keyes & Haidt, 2003; Krentzman, 2013; Seligman & Csikszentmihalyi, 2000). These individual *signature strengths* (Seligman & Csikszentmihalyi, 2000) described within the field of positive psychology parallel many of the quality of life outcomes outlined in the 12-step literature, and are among those emphasized in NA organizational literature (Narcotics Anonymous World Services, 2008). (For an examination of the associations among recovery-related predictors and psychological well-being in NA, see DeLucia et al., 2015). In the context of 12-step recovery models, in order to sustain long-term abstinence, individuals who suffer from substance use disorders are encouraged to examine their

own character traits—which may have potentially contributed to their pathological drug use—and develop positive traits such as gratitude, meaning in life, life satisfaction, and personal growth.

NA literature suggests that working the 12-steps provides a structure for the development of meaning in life, gratitude, and a deepening personal spirituality (Narcotics Anonymous World Services, 2008). The continual striving for personal growth within the context of 12-step recovery is similar to the construct of life enhancement discussed in positive psychology. While little data exist in regard to specific changes that occur in the recovery-related process of NA, positive psychology can provide a theoretical framework for examining these processes of psychosocial development. In other words, engagement in NA recovery processes ostensibly promotes an ongoing personal transformation in its members that does not simply focus on redressing deficits. Instead, there is a focus on individual flourishing indicated by positive changes in one's psychological, spiritual, and social spheres. The study of such flourishing is the crux issue uniting the positive psychology movement.

The current paper will examine four constructs that have been studied extensively in the context of positive psychology. Although these constructs have not been widely studied in the empirical literature surrounding 12-step recovery, they are widely discussed in organizational literature. As such, this paper will attempt to bridge the empirical literature of positive psychology and the program literature of 12-step organizations like NA by examining gratitude, meaning in life, satisfaction with life, and personal growth among individuals attending NA.

### **The Empirical Literature**

Several positive psychology constructs will be presented and reviewed. First, conceptual definitions are provided. Second, a review of instruments designed to measure

these constructs are presented. Third, studies that utilize these constructs as primary outcomes are reviewed. Fourth, a review of studies examining these constructs in 12-step samples and/or how these constructs are conceptualized within 12-step organizations is presented. Lastly, future directions and implications for each construct are discussed.

## Gratitude

### *Defining Gratitude*

Gratitude has been considered a valued human attribute across cultures and written about in religious and philosophical texts for many years. A review of the literature suggests that gratitude has many dimensions—including “an emotion, a virtue, a moral sentiment, a coping response, a skill, and an attitude” (Emmons & Crumpler, 2000, p. 56). In general, the literature characterizes the construct of gratitude as a pleasing and positive emotion that encompasses an awareness of the interconnectedness of human lives (McCullough, 2002).

*The Emotion of Gratitude.* Gratitude is an emotion of empathy that recognizes intentional benevolence and acknowledges altruism (Emmons & Shelton, 2002; Lazarus & Lazarus, 1994). The construct has been described as joy and appreciation in response to receiving a tangible benefit and a sense of thankfulness for benefactors (Emmons & Shelton, 2005). The emotion of gratitude has been described as having two stages, acknowledgement and recognition. Researchers also purport that gratitude results from *acknowledging* the goodness in an individual’s life, and then *recognizing* that the source of such goodness partially lies outside the self (Emmons & Shelton, 2005). As a result, gratitude is described in the literature as being highly adaptive in enhancing social bonds because it contains an interpersonal element of connection to others, nature, a higher power, or the universe (McCullough, 2002; Trivers, 1971).



The literature suggests that gratitude contains both affective and cognitive elements and provides for an increased sense of personal welfare that may lead to more meaningful and fulfilling life experiences (McCullough et al., 2002; Emmons & Shelton, 2002). In addition, studies have also suggested a resounding prosocial aspect of gratitude (McCullough et al., 2002). The tendency to engage in the prosocial aspect of gratitude by recognizing the benevolent roles of others and responding with grateful emotions, known as dispositional gratitude, is the focus of many empirical studies.

### *Measuring Gratitude*

Three scales to measure gratitude have received much empirical attention (see Table 1). The Gratitude Questionnaire is a six item unidimensional measure that assesses gratitude based on the frequency, intensity, and density of grateful affect on a 1-7 Likert scale (McCullough, Emmons, & Tsang, 2002). The Gratitude Questionnaire was designed based on individual differences in grateful affect across four individual studies (e.g., “I have so much in life to be thankful for, I am grateful to a wide variety of people”).

Another widely used measure is the gratitude subscale of The Appreciation Scale. The Appreciation Scale is a 57-item multidimensional measure comprised of eight subscales that measure different aspects of appreciation (e.g., have focus, awe). The gratitude subscale of The Appreciation Scale is comprised of ten items that measure behaviors that express gratitude on a 1-7 Likert scale (e.g., “I say “please” and “thank you” to indicate my appreciation,” “I value the sacrifices that my parents (or guardians) have made (and/or make) for me”).

The Gratitude, Appreciation, and Resentment Test is a 44-item multidimensional measure comprised of three subscales that measure gratitude towards other people

(1- Appreciation of others), the absence of feelings of deprivation (2- Sense of abundance), and gratitude towards non-social sources (3- Simple appreciation) (Watkins, Grimm, & Kolts, 2004).

An examination of the subscales of these three measures revealed eight underlying and distinct aspects of gratitude: (1) grateful affect, (2) appreciation of other people, (3) a focus on what the person has, (4) feelings of awe when encountering beauty, (5) behaviors to express gratitude, (6) focusing on the positive in the present moment, (7) appreciation rising from understanding life is short, and (8) positive social comparisons (Wood, Froh, & Geraghty, 2010).

#### *Empirical Examination of Gratitude*

A study examined the effect of a grateful outlook on physical and psychological well-being in a sample of 201 undergraduate participants (73% female) (Emmons & McCullough, 2003). Participants were randomly assigned to one of three conditions (gratitude, hassles, events/control) and completed weekly logs of physical ailments, coping behaviors, emotions, and health behaviors (e.g., exercising, drinking) for a total of ten weeks. All participants rated their feelings on well-being, social support, and expectations for the week. Primary results revealed that participants in the gratitude condition reported fewer physical complaints and spent more time engaging in health promoting behaviors (e.g., exercise). In addition, participants in the gratitude condition reported a greater degree of subjective well-being and optimism as compared to the other two conditions. Results of the study suggest that gratitude has a positive effect on several aspects of psychosocial functioning.

In a sample of 65 adults (68% female) with either congenital or adult-onset neuromuscular disease, researchers evaluated the usefulness of a gratitude intervention

(Emmons & McCullough, 2003). Participants were randomly assigned to one of two conditions (gratitude, control) and asked to complete daily experience rating forms for a total of three weeks. All participants rated their affect, subjective well-being, health behaviors, and activities of daily living on a nightly basis. Those in the gratitude condition were also instructed to record events that they were grateful for on a daily basis. Authors revealed that participants in the gratitude condition reported significantly greater positive affect and significantly lower negative affect than those in the control condition. In addition, participants in the gratitude condition reported increased feelings of well-being and improved sleep as compared to the control condition. Researchers suggested that a conscious focus on events that individuals feel grateful for may have interpersonal and emotional benefits (Emmons & McCullough, 2003).

A review of the literature suggests that gratitude prompts individuals to behave prosocially (McCullough, Kilpatrick, Emmons, & Larson, 2001). In order to examine this relationship, a researcher measured prosocial responses, positive mood, and self-reported levels of gratitude following a laboratory induction of gratitude in 40 female undergraduate students (Tsang, 2006). Participants were randomly assigned to one of two conditions (favor condition, chance/control condition), partnered, and given set sums of money to distribute across several rounds. Participants in the favor condition were told that their partner had given them a certain amount of money, while those in the chance condition were informed that they had received an amount of money by chance. Following distribution of funds, participants completed questionnaires regarding the underlying motivation for their behaviors. Items designed to measure expression of appreciation in the motivation questionnaire constituted the measure of gratitude. Overall, participants in the favor condition reported being more motivated by gratitude to distribute

their monetary resources as compared to individuals in the chance/control condition, providing support for the prosocial nature of gratitude (Tsang, 2006).

Another study suggested that gratitude promotes relationship maintenance (Gordon et al., 2012). Researchers developed a measure of appreciation in order to examine the link between appreciation and responsiveness in a combined cross-sectional and 14-day study of individuals in romantic relationships. Participants ( $N = 78$ ,  $M_{\text{age}} = 21$ ,  $SD = 2.51$ , 83% female) completed daily online diaries that assessed for feelings of appreciation, responsiveness, and satisfaction with their partner. Primary results indicated that people who felt more appreciated by their partners reported being more grateful for them, which led to increased grateful feelings the following day. Participants who reported being more grateful for their partners also reported being more responsive to their partner's needs. In addition, results indicated that feelings of gratitude mediated the appreciation to responsiveness association, suggesting that gratitude is important for the successful maintenance of intimate bonds (Gordon et al., 2012). The authors also suggest that feelings of gratitude may be a better predictor of relationship maintenance than feelings of satisfaction.

#### *Gratitude and 12-Step Recovery*

Gratitude is a common theme among individuals involved in 12-step organizations, but it has not been studied in the context of 12-step recovery. Similar to an activity described in one of the intervention studies above, it is often recommended that 12-step members record a daily list of events for which they are grateful, as outlined in AA's *Big Book* (Alcoholics Anonymous, 2001) and NA's *Basic Text* (Narcotics Anonymous, 2008). In a search of the sixth edition of NA's *Basic Text*, the term gratitude occurs 26 times and the term grateful occurs 59 times (e.g.,

“In recovery, we also strive for gratitude,” p. 83; “When we forget the effort and the work that it took us to get a period of freedom in our lives, a lack of gratitude sinks in, and self-destruction begins again,” p. 65).

### *Future Directions and Implications of Gratitude*

The positive psychology movement has led to a more detailed examination of the gratitude construct, including the possibility of gratitude interventions (Emmons & McCullough, 2003), the prosocial nature of gratitude (McCullough et al., 2001; Tsang, 2006), and the relationship between gratitude and relationship maintenance (Gordon et al., 2012). A thorough examination of gratitude may function to assist in the development of interventions aimed at attenuating negative affect and enhancing the emotional and physical lives of individuals (Csikszentmihalyi, 1999; Emmons & McCullough, 2003). Such objectives parallel goals outlined in the 12-step literature discussed above. Future 12-step research should examine measurement-related issues involving gratitude—including its pattern of association with other similar constructs, and also its association with core recovery practices.

## Meaning in Life

### *Defining Meaning in Life*

Meaning in life has been defined in a variety of ways throughout the literature—including coherence in one’s life (Battista & Almond, 1973), purposefulness (Ryff & Singer, 1998), and an individual’s subjective experience of significance in life (Crumbaugh & Maholick, 1964). Despite these differences, meaning in life is consistently regarded as crucial to living authentically (Martos, Thege, & Steger, 2010), and in contributing to the eudaimonic (yoo-dey-mon-ik) theories of well-being—which focus on psychological strengths beyond pleasant affect. The eudaimonic theory of well-being

conceptualizes the development of optimal human functioning and happiness as the act of engaging in personally expressive behaviors during meaningful goal pursuits (Ryan & Deci, 2001). Meaning in life is considered a distinct dimension of psychological well-being (Martos et al., 2010), and under the eudaimonic perspective, has been recently defined as the extent to which individuals identify significance in their lives and understand it (McMahan & Renken, 2011). Meaning in life is also described as the degree to which individuals perceive themselves to have an all-encompassing goal in life (Steger, 2009).

Authors postulate that humans are characterized by an intrinsic drive to find significance and meaning in their lives, and that failure to achieve such meaning results in psychological distress (Frankl, 1963; Steger, Frazier, Oishi, & Kaler, 2006). Consistent with the eudaimonic theories of well-being, there is support for the proposed link between lack of meaning in life and psychological distress (Steger et al., 2006). Having less meaning in life has been associated with anxiety and depression (Debats, van der Lubbe, & Wezeman, 1993), suicidal ideation (Harlow, Newcomb, & Bentler, 1986), a greater need for psychological services (Battista & Almond, 1973), and substance abuse (Harlow et al., 1986). Conversely, having more meaning in life has been positively associated with other measures of healthy psychological functioning, such as happiness (Debats et al., 1993), life satisfaction (Chamberlain & Zika, 1988), and work enjoyment (Bonebright, Clay, & Ankenmann, 2000).

### *Measuring Meaning in Life*

The meaning in life construct has received considerable attention in the measurement literature given the breadth of existing assessments that have been designed

to tap in to various aspects of the construct (Brandstatter, Baumann, Borasio, & Fegg, 2012). A review of the literature revealed that there are currently more than 45 assessment instruments for meaning in life, each measuring different aspects of the construct that are consistent with existing meaning in life definitions (e.g., presence of meaning in life, search for meaning in life, crisis and sources of meaning in life, meaning making, meaningful activity, meaning in life in the context of illness). Consistent with the eudaimonic theory for meaning in life presented earlier, a review of instruments measuring the presence and/or search for meaning in life will be presented below (see Table 1).

The Meaning in Life instrument is a 20 item multidimensional measure that assesses five subscales of meaning in life on a five-point Likert scale (Tomich & Helgeson, 2002). The Meaning in Life instrument was designed to measure the construct across five subscales: (1) Search for meaning, (2) Benefit, (3) Harm, (4) Personal growth, and (5) Acceptance. The benefit and harm subscales are each comprised of a single item, the search for meaning subscale is comprised of two items, the acceptance subscale is comprised of seven items, and the personal growth subscale is comprised of nine items. This measure was developed using a sample of female breast cancer patients and a sample of healthy age-matched women.

The Life Meaningfulness Scale is an 18 item multidimensional instrument that measures four subscales related to the construct: (1) Overall sense of meaning, (2) Cognitive component, (3) Motivational component, and (4) Affective component (Halaman, 2005). The Life Meaningfulness Scale was developed using a sample of university and elderly students.

The Meaning in Life Questionnaire is a ten item multidimensional measure that assesses two primary facets of meaning in life on a seven-point Likert scale (Steger et al., 2006). The two subscales of the Meaning in Life Questionnaire include (1) Presence of meaning in life (e.g., “I understand my life’s meaning,” “My life has a clear sense of purpose”), and (2) Search for meaning in life (e.g., “I am looking for something that makes my life feel meaningful,” “I am seeking a purpose or mission for my life”).

A follow-up study of the Meaning in Life Questionnaire resulted in the construction of The Daily Meaning Scale, a four item multidimensional instrument that measures two similar subscales (Kashdan & Steger, 2007). The two subscales of the Daily Meaning Scale assess (1) Daily meaning and (2) Daily search for meaning, on a 1-7 Likert scale.

#### *Empirical Examination of Meaning in Life*

The association between personality and meaning in life was examined in a sample of 202 participants ( $M_{\text{age}} = 31.7$ ,  $SD = 13.7$ , 69% female) in Germany (Schnell & Becker, 2006). Participants completed a meaning in life questionnaire (Sources of Meaning and Meaningfulness Questionnaire) and personality measures. A multiple regression revealed that specific sources of meaning in life (e.g., fun, wellness, morality, tradition, power, love, harmony, development) were explained by personality factors (Schnell & Becker, 2006). Based on results, authors suggested that individuals have a predisposition for particular sources of meaning dependent on their personality. In particular, researchers noted that individuals with the capability of self-transcendence and individuals that are extraverted are prone to experience their lives as meaningful (Schnell & Becker, 2006).



Previous research has linked meaning in life and religiosity (Batson & Stocks, 2004; Park, 2005; Silberman, 2005). A study examined the relationship among distinct domains of religiosity (acceptance of religious beliefs, symbolic approach to religious questions) and meaning in life (presence of meaning, search for meaning) in two adult samples in Hungary (Martos, Thege, & Steger, 2010). In the first sample, participants ( $N = 330$ ,  $M_{\text{age}} = 32.9$ ,  $SD = 13.9$ , 52% female) completed assessments designed to measure meaning in life (Purpose in Life Test), existential perspectives, and two dimensions of religiosity. Results revealed a positive association between meaning in life and both dimensions of religiosity (acceptance, approach). Researchers suggest that a flexible balance between acceptance and approach to religiosity may support the presence of meaning in life, while a rigid approach to religion may diminish meaning in life (Martos et al., 2010).

In a second sample ( $N = 437$ ,  $M_{\text{age}} = 28.7$ ,  $SD = 12.4$ , 61% female), participants completed assessments designed to measure personality, two dimensions of religiosity, existential perspectives, and presence and search for meaning in life (Meaning in Life Questionnaire) (Martos et al., 2010). Results revealed that both presence and search for meaning were positively associated with acceptance of religious beliefs. Regression analyses revealed that personality and religiosity accounted for significant variance in the presence of meaning in life. Authors suggest that there is a link between religiosity and meaning in life above and beyond personality characteristics.

The relationships among eudaimonic dimensions of well-being (conceptions of well-being), meaning in life, and self-reported well-being (experienced well-being) was examined in a sample of 275 participants ( $M_{\text{age}} = 37.9$ ,  $SD = 14.23$ , 68% female)

(McMahan & Renken, 2011). In this sample of adults, researchers used cross-sectional data and structural equation modeling to examine if the relationship between an individual's conception of well-being and experienced well-being was mediated by meaning in life (Meaning in Life Questionnaire). Results suggested that meaning in life partially mediated the relationship between how an individual defines well-being (conception of well-being), and how much well-being they are experiencing (experienced well-being). Researchers concluded that meaning in life is likely an important route through which eudaimonic conceptions of well-being are associated with positive psychological functioning (McMahan & Renken, 2011).

Previous studies have suggested that meaning in life is a protective factor associated with lower levels of aggressive and antisocial behaviors (Shek, Ma, & Cheung, 1994), and higher levels of healthy behaviors (Brassai, Piko, & Steger, 2011). A cross sectional study examined the relationship among meaning in life (Meaning in Life Questionnaire), hopelessness, problem behaviors, and health-enhancing behaviors (Brassai, Piko, & Steger, 2012) in a sample of 426 Eastern European adolescents ( $M_{\text{age}} = 16.5$ ,  $SD = 1.3$ , 57.9% female). Primary results indicated that search for meaning, presence of meaning, and hopelessness were significant predictors for problem behaviors (aggressive/antisocial, irresponsible academic/work behaviors) and health-enhancing behaviors (healthy eating, physical activity), with search for meaning producing the largest effects. Results suggest that the search for meaning in life plays a significant role in past and anticipated future involvement with adolescents' problem and health-enhancing behaviors (Brassai et al., 2012).

A review of the empirical literature suggests that meaning in life is an important correlate of health and well-being, but little is known about how the construct may change over time (Krause & Hayward, 2013). A large scale study of 1,011 older adults ( $M_{\text{age}} = 79.1$ ,  $SD = 7.4$ , 63% female) utilized second-order confirmatory factor models to examine changes in meaning in life over time. Participants completed an assessment designed to measure meaning in life every two years for a total of 10 years. Results of these analyses revealed no significant changes in the construct over the study period, suggesting that the way older individuals interpret meaning in life tends to remain relatively stable over time (Krause & Hayward, 2013).

#### *Meaning in Life and 12-Step Recovery*

Learning how to navigate the world and find meaning in life is one of NA's core principles (for a list of NA's 12-steps, see Table 2). NA literature suggests that the process of searching for and attaining meaning in life is one of the gifts of recovery associated with 12-step involvement (Narcotics Anonymous World Services, 2008). The substance abuse literature suggests that meaning in life plays a key role in the therapeutic outcomes of users (Flora & Stalikas, 2012).

A study in Greece examined how different constructs (e.g., taking steps, self-efficacy, perceived social support, positive emotions, meaning in life, problem recognition, ambivalence, depression, stress ) varied among a sample of recovering individuals ( $N = 157$ ,  $M_{\text{age}} = 30.03$ ,  $SD = 5.1$ , 19.7% female) diagnosed with a substance use disorder in three stages of treatment (i.e., counseling center, residential phase, social re-integration) (Flora & Stalikas, 2012). The study measured two aspects of meaning in life using the Meaning in Life Questionnaire: (1) Presence of meaning in life, and (2)

Search for meaning in life. Results of the repeated measures design revealed that participants reported a significant increase in meaning in life, and a significant decrease in negative factors (e.g., depression, stress) following treatment. In particular, researchers concluded that since treatment for substance use is often continuous, searching for meaning is particularly crucial for the recovery process (Flora & Stalikas, 2012).

Researchers have also examined the relationship among AA prescribed practices with abstinence, depression, and meaning in life in a sample of 76 participants ( $M_{\text{age}} = 43.1$ , 31.6% female) who completed a two-year follow-up after completing a Minnesota Model treatment program in England (Gomes & Hart, 2009). Preliminary analyses revealed that higher levels of AA prescribed practices were associated with lower depression, greater meaning in life, and greater abstinence (Gomes & Hart, 2009). In addition, results revealed that overall level and type of AA involvement significantly predicted meaning in life. Researchers indicated that meaning in life was uniquely related to the search for a personal moral inventory (step 4), admitting the nature of personal wrongs (step 5), having a sponsor, and praying regularly (i.e., involvement in step 11). Results suggest that adherence to AA-sanctioned practices may contribute to greater reported levels of meaning in life, that may in turn bolster well-being (Gomes & Hart, 2009).

Unfortunately, few studies have examined meaning in life in the context of 12-step recovery. Although the studies reviewed above provide preliminary information on the link between meaning in life and positive psychosocial outcomes (e.g., self-efficacy, social support, positive affect) in substance use research, they are limited by their lack of participants with more long-term recovery. In addition, no studies have examined meaning in life in an NA sample.

### *Future Directions and Implications of Meaning in Life*

12-step organizations postulate that a continual search for meaning is vital to achieving continuous abstinence (Narcotics Anonymous World Services, 2008). The psychological literature suggests that meaning in life is associated with self-transcendence (Schnell & Becker, 2006), spirituality (Martos et al., 2010), positive psychological functioning (McMahan & Renken, 2011), and health-enhancing behaviors (Brassai et al., 2012). All of these associations are directly related to goals outlined in 12-step literature in order to facilitate recovery. As such, a thorough examination of meaning in life in the 12-step context may function to better understand the process of recovery and assist in the development of interventions to garner greater therapeutic outcomes beyond abstinence.

### Life Satisfaction

#### *Defining Life Satisfaction*

The construct of life satisfaction has also received considerable empirical attention. In studying subjective well-being, researchers have identified two components: an affective component (Diener & Emmons, 1984), and a cognitive component (Andrews & Withey, 1976). Life satisfaction is the cognitive component of subjective well-being. More specifically, life satisfaction refers to a judgment process, in which individuals consciously appraise the quality of their lives on the basis of unique personal goals or criteria (Shin & Johnson, 1978). The degree of match between one's perceived life circumstances and self-imposed goals or criteria results in their subjective level of life satisfaction. The higher the individual's perceived degree of concordance between their set standards and life circumstances, the higher their report of life satisfaction (Pavot & Diener, 1993).

### *Measuring Life Satisfaction*

Although many measures of life satisfaction have been developed, many are limited to single item questions or are only appropriate for use with certain populations (e.g., geriatric individuals) (Pavot & Diener, 1993). In addition, few instruments assess life satisfaction as a global index in terms of individual cognitive appraisals (Diener, Emmons, Larsen, & Griffin, 1985). One of the most widely used instruments for measuring global life satisfaction that is dependent on the cognitive-judgmental process is The Satisfaction with Life Scale (Spalding & Metz, 1997; Pavot & Diener, 1993) (see Table 1). The Satisfaction with Life Scale is a five item unidimensional measure designed to assess a person's global judgment of life satisfaction, dependent on the individual's unique life circumstances and standards (Pavot & Diener, 1993). All five items measure a single underlying factor of global satisfaction on a 1-7 Likert scale (e.g., In most ways my life is close to ideal, The conditions of my life are excellent).

### *Empirical Examination of Life Satisfaction*

Personal goals have been identified as potentially important contributors in one's assessment of life satisfaction (Rapkin & Fischer, 1992). Participants ( $N = 179$ ,  $M_{\text{age}} = 73.3$ ,  $SD = 6.7$ , 76.8% female) in a study designed to examine the relationship between goals and life satisfaction reported on recent and past life events and completed questionnaires designed to measure personal goals, general well-being (Life Satisfaction Index), and domain satisfaction. Primary results indicated that life satisfaction was positively associated with social maintenance and energetic life-style goals, and negatively associated with concerns for improvement, stability, disengagement, and reduced activity (Rapkin & Fischer, 1992). Results of cluster analyses revealed that life

satisfaction differed only for individuals characterized as socially engaged, suggesting a direct connection between interpersonal relationships and overall satisfaction (Rapkin & Fischer, 1992).

Another study examined the relationship between career calling and life satisfaction in a sample of 553 working adults ( $M_{age} = 31.69$ ,  $SD = 9.93$ , 52% female) (Duffy, Allan, Autin, & Bott, 2013). Participants completed instruments designed to measure life meaning (Meaning in Life Questionnaire), life satisfaction (The Satisfaction with Life Scale), work meaning, career commitment, job satisfaction, and two domains of career calling (perceived call, living a call). Primary results indicated that career calling was positively associated with life satisfaction. Researchers suggest that living a calling may relate to people's sense of life meaning, which in turn may promote life satisfaction (Duffy et al., 2013).

The empirical literature suggests that appreciation is related to life satisfaction and positive affect over and above the effects of other constructs and covariates (Adler & Fagley, 2005). A recent study examined the relationship between appreciation and life satisfaction while controlling for demographics, personality factors, and gratitude in a sample of 243 undergraduates (Fagley, 2012). Participants completed several instruments designed to assess appreciation, gratitude, personality, and life satisfaction (The Satisfaction with Life Scale). Primary results revealed that appreciation made a significant and unique contribution to life satisfaction after controlling for demographic, personality factors, and gratitude, suggesting that appreciation is a key component in the construct of life satisfaction.

In an attempt to better understand the relationship between quality of life and self-perceived health, a recent study examined the relationship between life satisfaction and health-related quality of life in a sample of Spanish adults (Garrido, Mendez, & Abellan, 2013). Researchers interviewed participants ( $N = 870$ ,  $M_{\text{age}} = 43.8$ , 50% female) in their homes and collected information on life satisfaction (Satisfaction with Life Scale), self-perceived health, and personal characteristics. Primary results revealed a positive association between life satisfaction and health-related quality of life. Researchers suggest that interventions aimed at increasing or supporting life satisfaction may have similar effects on health-related quality of life, and vice versa (Garrido et al., 2013).

#### *Life Satisfaction and 12-Step Recovery*

Researchers of 12-step recovery purport that life satisfaction is necessary for the maintenance of successful sobriety (Spalding & Metz, 2008). Unfortunately, only one study has examined the construct of life satisfaction or quality of life in the context of 12-step recovery. Researchers in this study examined stress and life satisfaction as a function of time in recovery in a sample of recovering participants ( $N = 353$ ,  $M_{\text{age}} = 43$ ,  $SD = 8$ , 44% female) from New York City who met DSM-IV criteria for substance abuse or dependence of any illicit drug (Laudet & White, 2008). Participants completed an in-person interview that assessed dependence severity, abstinence duration, stressful life events, recovery support, social support, spirituality, life meaning, religious practices, 12-step affiliation, and quality of life satisfaction. Primary results revealed that greater periods of abstinence duration were associated with lower levels of stress and greater levels of life satisfaction, and that recovery-related facets (e.g., social support, spirituality) were significant predictors of life satisfaction.



Although the study above provides information supporting the link among abstinence duration, several recovery-related facets, and life satisfaction, little is known about how other positive psychological characteristics (e.g., gratitude, meaning in life) may relate to life satisfaction within the context of 12-step recovery. The study is also limited by its lack of data on individuals with longer recovery durations. In addition, because this study utilized participants from a treatment facility, it is particularly difficult to derive conclusions regarding life satisfaction in members of NA.

#### *Future Directions and Implications of Life Satisfaction*

Considering that the overall goal of 12-step recovery is to achieve continuous abstinence while developing several different facets of positive functioning (e.g., becoming spiritual, becoming prosocial, searching for meaning), one might speculate that recovery-related involvement may serve to increase life satisfaction. Life satisfaction has been linked with the maintenance of positive interpersonal relationships (Rapkin & Fischer, 1992), an individual's sense of life meaning (Duffy et al., 2012), gratitude (Fagley, 2012), and health-related quality of life (Garrido et al., 2013)—components of positive psychological functioning mentioned in the 12-step literature as vital to the recovery process. A thorough examination of life satisfaction in the context of 12-step recovery may provide insight into the process of achieving abstinence, as well as provide information on how members of 12-step organizations rate and attain overall satisfaction. The study of life satisfaction in the context of 12-recovery may also offer a greater understanding of the developmental nature of the construct—providing data that may help explain the theory of 12-step recovery.

## Personal Growth

### *Defining Personal Growth*

Personal growth is a relatively understudied construct in the empirical literature. The construct is described as an on-going process of self-actualization as a way of approaching life (Maslow, 1970), that is consistently changing and striving to attain some ideal (Erickson, 1950). The engagement in this process of self-actualization is what theorists purport is personal growth—the act of striving versus reaching the ideal (Prochaska & Norcross, 1994). Although personal growth can be stimulated by developmental (e.g., child develops complex form of moral reasoning), or environmental processes (e.g., need for increase in self-sufficiency following death of spouse), these changes are often met with resistance (Robitschek, 1998). Personal growth stimulated by intentional processes is when an individual is fully aware that change is occurring and willingly involved in the process. This intentional personal growth, often coined personal growth initiative, is what researchers suggest is important for the healthy individual to flourish (Robitschek, 1998).

Personal growth includes cognitive components, such as being committed to the growth process and knowing the processes involved in change, as well as behavioral components that initiate and carry on the growth process. Researchers have postulated that this intentional involvement in change may provide a greater knowledge base in understanding the factors that contribute and protect against emotional distress, and contribute to/enhance well-being (Hardin, Weigold, Robitschek, & Nixon, 2007).

### *Measuring Personal Growth*

Few scales to measure personal growth have been developed (see Table 1). One of the first scales developed to measure the construct of personal growth, specifically relating to the active and intentional involvement in changing, was the Personal Growth Initiative Scale (Robitschek, 1998). The Personal Growth Initiative Scale is a 9 item measure that assesses personal growth on a 1-6 Likert scale. The Personal Growth Initiative Scale measures individual differences in one's purpose and direction in life (e.g., "I have a good sense of where I am headed in my life").

A follow-up study, identifying the cognitive and behavioral aspects of intentional personal growth, resulted in the Personal Growth Initiative Scale-II (Robitschek et al., 2012). The Personal Growth Initiative Scale-II is a 33-item multidimensional measure comprised of 4 subscales which measure different aspects of personal growth:

- (1) Planfulness (e.g., "I set realistic goals for what I want to change about myself"),
- (2) Using resources (e.g., "I ask for help when I try to change myself"), (3) Readiness for change (e.g., "I can tell when I am ready to make specific changes in myself"), and
- (4) Intentional behavior (e.g., "When I get a chance to improve myself I take it").

### *Empirical Examination of Personal Growth*

The empirical literature suggests a positive association between personal growth and positive functioning, and a negative association between personal growth and distress or poor functioning (Hardin et al., 2007). For example, higher levels of personal growth have been linked to higher levels of happiness, psychological well-being, self-acceptance, and life satisfaction; and lower levels of distress, anxiety, and depression (Hardin et al., 2007). As a result of these findings, researchers have suggested that personal growth may

prevent, minimize, or facilitate recovery from distress symptoms (Hardin et al., 2007). To date, empirical studies examining the construct of personal growth are fairly limited.

In an attempt to better understand the link between personal growth and positive functioning (Robitschek & Kashubeck, 1999), the relationship among affect, problems, and personal growth initiative was examined in a sample of 134 undergraduate students ( $M_{age} = 19.52$ ,  $SD = 1.66$ , 76.1% female) from the Southwest (Hardin et al., 2007).

Researchers hypothesized that personal growth initiative would moderate the relation between problems and affect, and that successful resolution of potential problems would mediate the association between personal growth initiative and affect (Hardin et al., 2007). Although results did not support personal growth initiative as moderating the relationship between problems and affect, results suggested that resolution of problems partially mediated the personal growth initiative to affect association. Researchers concluded that results of the study suggest that individuals higher in personal growth initiative experience less social anxiety in part by maintaining lower levels of problems (Hardin et al., 2007).

#### *Personal Growth and 12-Step Recovery*

Personal growth is valued as one of the ultimate gifts following complete and continuous abstinence in members of 12-step organizations. NA's *Basic Text* emphasizes that achieving the principle of complete abstinence is shaped by the foundation of the NA members' recovery involvement and continued pursuit of personal growth (Narcotics Anonymous World Services, Inc., 2012).

A study examined the construct of personal growth within the context of 12-step involvement and spirituality utilizing a grief and loss paradigm (Streifel & Servaty-Seib, 2009). This study analyzed the extent to which reactions to recovery-related losses mediate the

relationship between 12-step involvement and recovery-related outcomes. Participants ( $N = 128$ ) were active recovering substance abusers recruited from either a 12-step recovery center from a Midwestern state or via an online public message board. Study participants ( $M_{\text{age}} = 47.6$ ,  $SD = 6.6$ , 59% female) completed measures on recovery, AA/NA involvement, spirituality, painful grief reactions, and personal growth. Researchers utilized a personal growth subscale of the Hogan Grief Reaction Checklist to evaluate the construct. Primary results revealed a positive association among personal growth, spirituality, and 12-step involvement. Results of mediation analyses revealed that spirituality mediated the relationship between 12-step involvement and personal growth.

A recent study examined the relationships among several recovery-related practices and different facets of psychological well-being (i.e., personal growth, self-acceptance, purpose in life, positive relations with others) in a sample of NA members ( $N = 128$ ,  $M_{\text{age}} = 45.7$ ,  $SD = 10.84$ , 53.1% female) with at least one year of continuous abstinence (DeLucia et al., 2015). Study participants completed demographic information, 12-step recovery-related items (e.g., abstinence duration, comfort at home group, years of NA service), and a measure of Psychological Well-Being (Ryff, 1995) that included a subscale of personal growth. Hierarchical regression analyses examined whether recovery-related practices accounted for significant incremental variance in personal growth, over and above the effects of several statistical control variables (i.e., covariates). Primary results revealed that although the full set of predictors (i.e., covariates and recovery-related predictors) accounted for significant variance in personal growth, recovery-related predictors (entered on the second block) did not account for significant incremental variance in the construct. Comfort at one's group was a significant and unique predictor of personal growth, providing support for the positive effects of social support and

interpersonal connections on psychosocial outcomes beyond abstinence in recovery (DeLucia et al., 2015).

Although the studies presented above provide support for the proposed link between recovery involvement and personal growth in the 12-step literature, they are limited by their cross-sectional design and participant self-selection bias.

#### *Future Directions and Implications of Personal Growth*

The 12-step literature postulates that personal growth is a continuously evolving gift of recovery that increases with recovery involvement, continuous abstinence, and the development of spirituality (e.g., “To ensure our continued growth and recovery, we have to learn to maintain our lives in a spiritually sound basis,” p. 36, “We recognize our growth when we are able to reach out and help others,” p. 46, “Complete and continuous abstinence, however, in close association and identification with others in NA groups, is still the best ground for personal growth, p. 62, *NA Basic Text*, 2008). The positive psychology movement has led to a more detailed examination of the personal growth construct and has found support for the associations between personal growth and happiness, life satisfaction, distress prevention, and successful problem-solving (Robitschek & Kashubeck, 1999; Hardin et al., 2007)—ultimate goals and skills that are outlined as recovery-related components in the 12-step literature.

#### **Integrative Conclusions**

Twelve step organizations are commonly sought mutual-help groups designed to address the prevalence and chronicity of substance use disorders. These organizations promote complete and continuous abstinence via a fellowship of members that engage in core recovery practices such as reciprocal helping, step-work, sponsorship, and spiritual practice. Empirical and 12-step organizational literatures suggest that these core recovery

practices lead to more optimal psychosocial outcomes beyond abstinence—and studies have supported the benefits of 12-step affiliation on quality of life outcomes (e.g., social support [Timko, 2008], spirituality [Laudet & White, 2008], positive affect [Christo & Sutton, 1994], psychological well-being [DeLucia et al., 2015]).

Core constructs discussed in the field of positive psychology parallel the psychological improvements often sought by members of 12-step organizations. The 12-step literature suggests that actively engaging in recovery results in a psychological transformation with the development of many positive traits—such as gratitude, a search for meaning in life, personal growth, and overall life satisfaction. These traits are regularly studied constructs within the field of positive psychology—but few studies have studied these constructs in the context of 12-step recovery (DeLucia et al., 2015). The purpose of this paper was to bridge the empirical literature of positive psychology and the program literature of 12-step organizations like NA, by examining gratitude, meaning in life, life satisfaction, and personal growth in the context of 12-step recovery.

The empirical literature describes the constructs of gratitude, meaning in life, life satisfaction, and personal growth as distinct facets of optimal functioning. Gratitude is conceptualized as the ability to recognize the benevolent roles of others and respond in a prosocial manner. It is argued that the acknowledgment and recognition of the actions of others leads to highly adaptive social bonds that in turn lead to more meaningful and fulfilling life experiences. Meaning in life is described as an individual's subjective experience of significance or purposefulness and the extent to which they understand it. It is also conceptualized as the degree to which individuals perceive themselves to have an all-encompassing goal in life. Life satisfaction is conceptualized as a cognitive judgment

of gratification that is based on the appraisal of individual goals or criteria. The higher the degree of agreement between an individual's standards and life circumstances, the higher their report of life satisfaction. Personal growth is described as the act of engaging in a process of intentional self-actualization that is consistently changing and striving to attain some ideal.

A review of the positive psychology literature suggests that the constructs of gratitude, meaning in life, satisfaction with life, and personal growth may help protect against emotional distress and enhance well-being. Similarly, 12-step organizational literature suggests that these constructs are components of meaningful and successful recovery. In essence, many of the positive characteristics associated with these constructs (e.g., increases in positive affect) can potentially provide a greater understanding of 12-step recovery. Unfortunately, the limited number of studies examining the constructs of gratitude, meaning in life, life satisfaction, and personal growth in the context of 12-step recovery is a serious limitation of the current literature—which focuses mostly on substance-related abstinence. As a result, we know little about how these constructs are associated with one another or how to measure them in a 12-step population. We also know little about how various recovery practices and personal attributes might be associated with these positive outcomes.

Similarly, although all of these constructs are generally associated with positive functioning and the development of healthy interpersonal relationships (for a list of construct descriptions, see Table 3), they are continually regarded in both the empirical and 12-step organizational literature as distinct constructs. Interestingly, no study using 12-step members as participants has examined these constructs concurrently to



empirically test this notion. Examining these constructs within a measurement framework can potentially quantify differences among these positive traits and support/refute particularly salient research questions in the measurement literature that remain unexplored. Results of measurement analyses can add to the emerging literature on 12-step and positive psychology by quantifying and answering research questions such as:

- (1) For the self-report measures of each construct (gratitude, meaning in life, satisfaction with life, and personal growth), to what extent do the responses to the items conform to an appropriate item response theory (IRT) measurement model?
- (2) Is there empirical evidence to suggest that the four constructs inter-related? Furthermore, is meaning in life construct highly correlated (i.e.,  $r > .90$ ) with the construct, satisfaction with life?
- (3) Are the four constructs (gratitude, meaning in life, satisfaction with life, and personal growth) a function of an overarching factor, “well-being”?
- (4) How will the constructs of gratitude, meaning in life, satisfaction with life, and personal growth vary as a function of abstinence duration, recovery-related involvement, and specific person-level covariates (e.g., personality traits, social desirability, substance use severity, age, and sex)?

In order to better understand the benefits of 12-step involvement beyond abstinence and answer these important research questions, several recovery-related practices and psychosocial outcomes—including gratitude, meaning in life, life satisfaction, and personal growth—will be examined in the current study utilizing a sample of NA members.

## Methodological Framework

A greater understanding of the constructs of gratitude, meaning in life, life satisfaction, and personal growth can be achieved within a measurement framework. Classical test theory (CTT) is a measurement framework that is based on the traditional ideas of reliability and validity, while forms of modern test theory—such as Item Response Theory (IRT)—are based on the assumption that performance on tests are based on individual ability level (e.g., trait-level of person) and item qualities (e.g., difficulty of item) (Embretson & Reise, 2000). Two characteristics of items commonly taken into account with IRT modeling include item discrimination (the degree to which an item can differentiate individuals with varying trait levels) and item difficulty (the magnitude of trait level required for an individual to have a 50% probability of answering an item correctly) (see Crocker & Algina, 2008, Embretson & Reise, 2000, or Fraley, Waller, & Brennan, 2000). In contrast, CTT calculates test scores based on the sum of item scores and error:

$$X_O = X_T + X_E$$

where:

$X_O$  refers to the observed test score

$X_T$  refers to the true test score

$X_E$  refers to error

Since true scores and error are approximated values that can never be defined, classical test theory rests on several assumptions: (1) true scores and error scores are uncorrelated, (2) the average error score in the population of examinees is zero, and (3) error scores on parallel tests are uncorrelated (Embretson & Reise, 2000; Hambleton & Jones, 1993). According to measurement theory, if the assumptions of CTT are accurate, then statistical analyses performed

under either the CTT or IRT will yield similar results. However, this is often not the case (Embretson & Reise, 2000).

Differences in results between CTT and IRT usually stem from important distinctions between the models. For instance, classical test theorists tend to examine the psychometric properties of composite scores (i.e., total scores, average scores) that are limited by characteristics of the sample (e.g., homogeneity of participants, sample size, variability)—and directly influence  $p$  and  $r$  values. In other words, measurement analyses conducted in CTT are most useful when samples are very similar to those used in the development of the measure (Embretson & Reise, 2000; Hambleton & Jones, 1993). On the other hand, IRT relies on item-level analyses (Embretson & Reise, 2000; Hambleton & Jones, 1993) that are independent of the sample—therefore increasing the generalizability of findings. While scores on measures analyzed in CTT are dependent on test difficulty, measures analyzed in IRT are independent of individual characteristics (Embretson & Reise, 2000; Hambleton, Swaminathan, & Rogers, 1991).

Another advantage of IRT is that it provides a basis for matching items to ability levels. Item Characteristics Curves (ICCs) reflect the probabilities with which individuals across a range of traits levels are likely to answer an item in a certain way, allowing one to estimate the likelihood that an individual at a specific trait level would predict responses to a particular item (Crocker & Algina, 2008; Embretson & Reise, 2000). For example, a person with a low level of gratitude is unlikely to endorse the item, “If I had to list everything that I felt grateful for, it would be a very long list.” In addition, IRT provides more specific information regarding test reliability as compared to the single reliability estimates (e.g., coefficient alpha) produced in CTT (Crocker & Algina, 2008; Embretson & Reise, 2000). IRT may provide better test

information by producing multiple instrument reliabilities based on individual trait level. For example, a gratitude measure may have greater reliability in a sample of individuals with higher trait levels of gratitude than in a sample of individuals with low levels of the trait. Utilizing test information from IRT, one can identify whether a measure is able to accurately discriminate between individuals at various trait levels.

There are a wide variety of models that fall under the umbrella of IRT modeling. The most parsimonious model is the standard dichotomous Rasch (1960), which is a type of one parameter model. The mathematical theory underlying Rasch models is a special case of IRT, and more generally, a special case of a generalized linear model (Embretson & Reise, 2000). However, there are important differences that separate proponents of the Rasch model from traditional IRT. A central aspect of this divide relates to unidimensionality—the idea that the probability of endorsing any response category to an item solely depends on the subject ability and the item difficulty (Embretson & Reise, 2000). In essence, the ability being measured is theorized to account for the probability of endorsing a response. In addition, the specific measurement property that distinguishes the Rasch model from other IRT models is specific objectivity—the implication that comparisons between individuals are independent of which particular items within the class considered have been used (Embretson & Reise, 2000). As such, the Rasch model conceptualizes the measurement scale on an interval level, like a ruler.

For the standard dichotomous Rasch model, the dependent variable is the individual's dichotomous response (i.e., correct/incorrect, true/false, reject/accept) to a specified item, while the independent variables are the individual's trait score,  $\theta_s$ , and the item's difficulty level,  $\beta_i$  (see Embretson and Reise, 2000 for the equation for the standard dichotomous Rasch). For instruments with a polytomous response format (items with three or more response categories

such as in a Likert-type scale), a more complex model—known as the partial credit model (PCM) is utilized (Embretson & Reise, 2000). The PCM is appropriate for analyzing attitude or personality scale responses where subjects rate their beliefs, or respond to items on a multi-point scale (Masters & Wright, 1996). The PCM can be considered an extension of the dichotomous Rasch, as it contains all the standard model features such as separability of person and item parameters (Embretson & Reise, 2000). The PCM is expressed as:

$$Pr\{X_{ij} = x\} = \frac{e^{\sum_{k=0}^x (\theta_j - \tau_{ki})}}{\sum_{x=0}^m e^{\sum_{k=0}^x (\theta_j - \tau_{ki})}}$$

where:

$X_{ij}$  refers to the response ( $x$ ) made by subject  $i$  to item  $j$

$\theta_j$  refers to the trait level of subject  $j$

$\beta_i$  refers to the difficulty of item ( $i$ )

$\tau_{ki}$  is the threshold ( $k$ ) of the rating scale of item ( $i$ )

$e$  is the base of the natural logarithm

A more parsimonious version of the PCM is the Rasch Scale Model (RSM) (Embretson & Reise, 2000). Importantly, the RSM varies from the PCM because the RSM restricts thresholds across items to be equal, specifying that the items all share the same rating scale structure. This model is expressed as:

$$Pr\{X_{ij} = x\} = \frac{e^{\sum_{k=0}^x [\theta_j - (\beta_i - \tau_k)]}}{\sum_{x=0}^m e^{\sum_{k=0}^x [\theta_j - (\beta_i - \tau_k)]}}$$

where:

$X_{ij}$  refers to the response ( $x$ ) made by subject  $i$  to item  $j$

$\theta_j$  refers to the trait level of subject  $j$

$\beta_i$  refers to the difficulty of item ( $i$ )

$\tau_k$  is the threshold ( $k$ ), which is *common to all items*

$e$  is the base of the natural logarithm

An alternative to the Partial Credit Model is the Graded Response Model (GRM), which allows for varying *item discrimination* (e.g., slopes can vary across items) and *item difficulty* in measures with polytomous response formats (Embretson & Riese, 2000). The graded response model specifies the likelihood that an individual with a given ability will provide a response ( $x$ ) that falls in or above a given category threshold ( $j = 1 \dots m_i$ ) conditional on trait level,  $\theta$ :

$$Pr_{ix}(\theta) = \frac{e^{[\alpha_i(\theta - \beta_{ij})]}}{1 + e^{[\alpha_i(\theta - \beta_{ij})]}}$$

where:

$x$  refers to the response ( $x$ ) made by subject  $i$  to item  $j$

$\theta$  refers to the trait level of subject

$\beta_i$  refers to the difficulty of item ( $i$ )

$\beta_{ij}$  refers to the trait level to respond above the threshold ( $j$ ) for item ( $i$ ) with .5 probability

$e$  is the base of the natural logarithm

$\alpha_i$  refers to the slope of item ( $i$ )

(The reader is referred to Embretson and Reise, 2000 for a full description of this model and other commonly used IRT models not discussed in this paper.)

In order to provide better test information and improve instrument reliability, the current study will examine psychological instruments of gratitude, meaning in life, satisfaction with life, and personal growth within an IRT framework.

### **Contribution of the Present Study**

The current study has several interesting implications. Understanding the psychometric properties of these constructs in the context of 12-step recovery may help inform the measurement literature and ultimately provide a richer quantitative perspective on how these constructs inter-relate in individuals recovering from substance use disorders. After the constructs of gratitude, meaning in life, satisfaction with life, and personal growth are fully operationalized, the current study will be able to refine existing instruments to provide better test

information. These refined instruments will provide a better understanding of the nature of these constructs in a sample of NA members by analyzing associations between construct trait levels and recovery-related involvement.

In addition, test information provided within an IRT framework in the current study may provide markers to identify individuals who are “low” or “high” on each of these constructs, and potentially predict sustained remission of substance abuse difficulties among those seeking 12-step supports. Overall, these refined instruments will be able to gauge positive psychological functioning (e.g., gratitude, personal growth) in individuals involved in 12-step organizations in order to support continued abstinence. In essence, results of the current study will aid in the refinement of positive psychology assessments that are particularly salient for 12-step populations.

### **Statistical Analyses**

An IRT framework for the current study will be approached in three distinct phases. Measurement refinement using IRT procedures is often an idiographic data-driven process. As such, initial phases will ultimately inform subsequent phases of the measurement analyses to (1) provide the most accurate and reliable test information, and (2) arrive at the most representative instruments.

#### **IRT Modeling at the Individual Construct Level**

- I. First, a partial credit Rasch model will be employed to evaluate the psychometric properties of instruments designed to measure gratitude, meaning in life, satisfaction with life, and personal growth. This model will provide information regarding:
  - a. Item-fit (i.e., infit, outfit)

- i. The pattern of item endorsement
  - ii. Person fit
  - iii. Person reliability
  - iv. Item-reliability
- b. Average trait level
  - i. Ordered Rasch-Andrich threshold
  - ii. Ordered average of each construct instrument

### **Partial Credit Model**

- II. Second, the instruments selected will be analyzed within a partial credit model to allow for varying item discrimination. Results from this model will provide psychometric information for each instrument, as well as item-fit and average trait level statistics (as outline above in phase I). The measurement indices from the partial credit model will be compared to results of the partial credit Rasch model.

### **Dimensionality**

- III. Third, exploratory factor models will explore dimensionality among the constructs when responses from all instruments are entered into a single model. More specifically, a multidimensional IRT model will examine whether or not the constructs are distinct, and whether or not they can be better represented by a higher-order model (e.g., well-being).

### **Optimal Measurement Modeling**

- IV. Lastly, the optimal measurement model will be used to examine the association among the constructs, several recovery-related predictors, and person-level covariates. Specifically, a hierarchical regression model, utilizing estimated factor scores from the optimum measurement model, will analyze how gratitude,



meaning in life, satisfaction with life, and personal growth vary as a function of person-level covariates (e.g., personality traits, social desirability, substance use severity, age, sex), and recovery-related involvement.

## Method

### Procedure

Participants were recruited through two avenues: 1) initial recruit persons, and 2) posting a recruitment flyer to a social networking site dedicated to 12-step recovery. In order to participate, individuals were required to be 18 years or older and to have a minimum of one year's membership in Narcotics Anonymous (NA). Participants were directed to an online survey website which included the Informed Consent; an array of measures assessing constructs such as psychological well-being, social support, substance use severity, etc.; and a short demographics questionnaire. Initial entry into the study was stratified by abstinence duration and sex resulting in eight strata: women with 1-5 years clean, women with 6-10 years clean, women with 11-15 years clean, women with 16 or more years clean, men with 1-5 years clean, men with 6 to 10 years clean, men with 11 to 15 years clean, and men with 16 or more years clean. Upon completing the survey, instructions were given to contact the Principal Investigator to receive a \$30 e-gift card.

### Participants

Participants ( $N = 128$ ) ranged in age from 22 to 64 years old ( $M = 45.59$ ,  $SD = 10.82$ ). The percentage of females was only slightly higher than that of males (52.6% female). The sample was predominantly composed of those who identified as Caucasian (79.5%), with the remaining portion of individuals identifying as African American (12.1%), Latino (3%), Asian American (3%) and Other (2.4%). Abstinence duration ranged from a minimum of one year to 33 years in recovery ( $M = 11.87$ ,  $SD = 8.01$ ).

### Measures

Psychometric properties for the four constructs of interest (e.g., gratitude, meaning in life, satisfaction with life, personal growth) in the present study sample will be presented in the

results section. (A copy of the gratitude, meaning in life, satisfaction with life, and personal growth measures can be found in Appendix A, B, C, and D, respectively.)

**Gratitude Questionnaire-6 (GQ-6; McCullough et al., 2002; See Appendix A).**

This self-report instrument is designed to assess individual differences in grateful affect. Participants are given six statements (e.g., “I have so much in life to be thankful for,” “I am grateful to a wide variety of people”) and are instructed to indicate how much they agree with each statement based on individual characteristics. This rating is based on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree).

This measure accounts for one’s individual level of gratitude based on self-reported ratings of how much each statement is characteristic of their life. Fit indices from previous studies provide support for a one-factor structure for the GQ-6 [ $\chi^2$  (9,  $N = 235$ ) = 30.34,  $p < .001$ , comparative fit index (CFI) = .95, standardized root-mean-square residual (SRMR) = .04], as well as good internal consistency (Cronbach’s alpha coefficient = .82) (McCullough et al., 2002).

**Meaning in Life Questionnaire (MLQ; Steger et al., 2006; Appendix B).** This ten item self-report instrument is designed to assess presence and search for meaning in life. Participants are instructed to respond to five statements to assess for presence of meaning in life (e.g., “My life has a clear sense of purpose”), and five statements to assess for search for meaning in life (e.g., “I am always searching for something that makes my life feel significant”). For each item, participants are asked to think about what makes their life and existence feel important and significant, and then indicate how much they agree with each statement based on their thoughts. This rating is based on a 7-point Likert scale (1 = absolutely untrue to 7 = absolutely true).

Fit indices from previous studies provide support for a two-factor structure for the MLQ [ $\chi^2$  ( $N = 279$ ) = 56.04,  $p < .01$ , Normed Fit Index (NFI) = .97, Comparative Fit Index (CFI) =

.99], as well as good internal consistency for both MLQ subscales (Cronbach's alpha coefficient (presence) = .86; Cronbach's alpha coefficient (search) = .86) (Steger et al., 2006).

**Satisfaction with Life Scale (SWLS; Diener et al., 1985; Appendix C).** This self-report instrument is designed to measure global life satisfaction as defined by an individual's subjective sense of well-being. Participants are given five statements (e.g., "In most ways my life is close to my ideal," "The conditions of my life are excellent") and are instructed to indicate how much they agree with each statement based on individual characteristics. This rating is based on a 7-point Likert scale (1 = strongly disagree to 6 = strongly agree).

This measure accounts for one's individual level of global life satisfaction without tapping into related constructs of positive or negative affect. Based on inspection of a scree plot with eigenvalues, previous studies provide support for a one-factor structure for the SWLS. The one-factor structure of the SWLS accounts for 66% of the variance in the instrument. In addition, the SWLS has been characterized as having good internal consistency (Cronbach's alpha coefficient ranged from .82-.87) (Diener et al., 1985).

**Personal Growth Initiative Scale (PGIS; Robitschek, 1998; Appendix D).** This self-report instrument is designed to assess personal growth initiative (the active, intentional engagement in the process of personal growth), which encompasses self-efficacy, and a readiness to change a specific behavior or set of behaviors (see "Preparation Stage": Prochaska & DiClemente, 1992). Participants are given nine statements (e.g., "I know what I need to do to get started towards reaching my goals," "I take charge of my life") and are instructed to indicate how much they agree with each statement based on individual characteristics. This rating is based on a 6-point Likert scale (1 = disagree strongly to 6 = agree strongly).

This measure accounts for one's individual level of personal growth initiative based on self-reported ratings of how much each statement is characteristic of their life. Fit indices from previous studies provide support for a one-factor structure for the PGIS [ $\chi^2(27, N = 332) = 120.24, p < .001$ , Normed Fit Index (NFI) = .90, Comparative Fit Index (CFI) = .92], as well as good internal consistency (Cronbach's alpha coefficient ranged from .78-.88) (Robitschek, 1998).

**Recovery-Related Involvement.** These items related specifically to one's involvement in prescribed 12-step activities. Questions were developed centering on the regularity of attendance, home group involvement, engagement with NA literature, perceived connection to others, sponsorship, participation in events and meetings, and socialization (both before and after meetings) in terms of frequency (never/almost never, sometimes, often, always/almost always). Items were designed to capture the primary dimensions of NA recovery described by long-term NA members who participated in a prior qualitative study (DeLucia et al., 2015).

**Abstinence duration.** Abstinence duration, in years, was computed by subtracting the respondent's self-reported date of last substance use from the interview date.

**Substance use severity.** A marker of substance use severity was computed by averaging the z-scores of two items: (a) earliest age of any use of 12 substances; and (b) count of 12 substances for which participants endorsed problematic use (reverse scored).

**Unrealistic favorable presentation.** Unrealistic favorable presentation was measured by the Lie subscale of the Minnesota Multiphasic Personality Inventory – Second Edition (MMPI-2; Butcher et al., 2001). The scale consists of 15 true/false items (true = 0, false = 1). The items are then summed together; higher scores reflect higher levels of unrealistic favorable presentation.

***Lifetime frequency of step work.*** Lifetime frequency of step work was assessed by the item, “How many times have you worked NA's 12-steps with the assistance of an NA sponsor?”

***Home group comfort.*** Home group comfort was assessed by averaging two items: (a) “I feel very comfortable at my home group”; and (b) “I have a strong connection to others at my home group” ( $r(126) = .88, p < .001$ ). Response options for these items ranged from 1 (never/almost never) to 4 (always/almost always). (Individuals who did not currently have a home group were set to the minimum value of each item, an issue discussed further in the results section.)

***Lifetime involvement in NA-related service.*** NA-related service was assessed by adapting NA’s World Pool Information Form, a form the organization uses to assess member service involvement (Narcotics Anonymous World Services, 2012). Respondents reported on the number of positions they held across service levels (e.g., home group, area) and number of years of service in these various positions. These two items (total number of service positions and total years of service) were highly correlated,  $r(126) = .72, p < .001$ . Total number of years of NA service was computed.

## Results

### Overview

The analyses presented below follow recommendations for measurement refinement from an IRT perspective (Linacre, 2013), but deviate somewhat from initially proposed procedures given that instrument modification is a partially data-driven and iterative process. The results of the multi-step approach presented here should be considered preliminary, given the sample size ( $N = 128$ ).

The analyses progressed in several stages. First, for each measure, rating scale performance was assessed by examining Rasch-Andrich thresholds using WINSTEPS, which provides graphical representations of probability curves for each item. In addition, the frequency of endorsed response options was examined, in order to identify whether items were particularly discriminating among participants. Based on these findings, refinement of the response options (e.g., collapsing categories) was considered and employed for each instrument in order to improve the psychometric properties and discriminating nature of each measure.

Second, the model fit of each refined instrument was analyzed using a Rasch Rating Scale Model and a Partial Credit Model, using specialized software for WINSTEPS version 3.74.0. Chi-square difference analyses were then employed to identify the best-fit model for the data. The most optimal and parsimonious model was then used in all subsequent analyses.

Third, several item-level and instrument-level statistics were examined in WINSTEPS, including item fit, person fit, item discrimination, and instrument dimensionality.

Fourth, the items of all refined instruments were examined concurrently using a multidimensional IRT model in SAS (PROC IRT) to identify whether or not the constructs are indeed distinct and to determine the most optimum measurement model.

Fifth, a series of hierarchical ordinary least squares regression models were estimated. A set of recovery-related predictors (i.e., abstinence duration, lifetime frequency of step work, home group comfort, lifetime involvement in NA-related service) were utilized in each model, to determine each predictor's relative contribution to the overall model for each outcome (i.e., gratitude, life satisfaction, personal growth). A demographics block (i.e., age, sex), person-level covariates block (i.e., substance-use severity, unrealistic favorable presentation), and recovery-related predictor block were created. Each recovery-related predictor was tested individually to determine if it contributed variance over and above the demographics and covariates.

**Descriptive Statistics.** Descriptive statistics for the items of all instruments are provided in Table 4. None of the items were missing. Upon initial examination of the frequency count of endorsed responses, it was noted that some response categories were not endorsed for several items. For example, participants did not endorse “*strongly disagree*” for any of the first five items of the Gratitude Questionnaire (GQ – 6). Similarly, no participants endorsed “*definitely disagree*” for three of the items (i.e., items 1, 8, and 9) from the Personal Growth Initiative Scale (PGIS).

### **Refinement of the Rating Scale**

**Examination of response categories.** Rating scale performance for each instrument was evaluated by running a Partial Credit Model (PCM) in WINSTEPS. A summary of unrefined (original instrument) rating scale performance (i.e., observed frequency, observed average, Andrich threshold, item discrimination) for the Gratitude Questionnaire (GQ – 6), Satisfaction with Life Scale (SWLS), and Personal Growth Initiative Scale (PGIS) can be found in Tables 5, 6, and 7, respectively.

*Gratitude Questionnaire (GQ – 6).* Examination of thresholds on the Gratitude Questionnaire (GQ – 6) revealed disordered averages for categories 3 (*slightly disagree*), 4



(*neutral*), and 5 (*slightly agree*). That is, participants appeared to have a difficult time differentiating between response options 3, 4, and 5, indicating a possible misunderstanding between adjacent response options. Further, endorsing “*slightly agree*” did not require a substantially higher level of gratitude to endorse than “*slightly disagree*.” Consequently, categories 3, 4, and 5 were collapsed to create a new response category of “*neutral*.” A PCM with the new response categories for the Gratitude Questionnaire (GQ – 6) (i.e., “*strongly disagree*,” “*disagree*,” “*neutral*,” “*agree*,” and “*strongly agree*”) revealed an improvement in rating scale fit. A visual representation of the refined response scales for the GQ – 6 is provided in Table 8. Examination of item fit for the Gratitude Questionnaire (GQ – 6) items suggested appropriate infit and outfit (less than 1.33), with the exception of item 6 (See Table 11). This item evidenced infit and outfit values of 1.66 and 1.64, respectively. Due to disordered thresholds and poor item fit, item 6 (i.e., “*Long amounts of time can go by before I feel grateful to something or someone*”) was removed. Additionally, item discriminations varied substantially across items.

*Meaning in Life Questionnaire (MLQ)*. Examination of thresholds on the Meaning in Life Questionnaire (MLQ) revealed disordered averages across all categories. That is, participants appeared to have a difficult time differentiating between all response options. Despite several iterations of attempting to collapse response options and/or eliminate poor fitting items, ordered thresholds were never achieved. Given that IRT analyses requires ordered Andrich thresholds for proper interpretation, the Meaning in Life Questionnaire was ultimately dropped from all subsequent analyses secondary to its’ poor psychometric properties.

*Satisfaction with Life Scale (SWLS)*. Similar to the Gratitude Questionnaire, examination of thresholds on the Satisfaction with Life Scale (SWLS) revealed disordered averages for

categories 3 (*slightly disagree*), 4 (*neither agree or disagree*), and 5 (*slightly agree*). These disordered averages indicated that participants may have had a difficult time differentiating between these response options or that the differences between these categories were not meaningful, given that endorsing “*slightly agree*” did not require a substantially higher level of life satisfaction to endorse than “*slightly disagree*.” Consequently, categories 3, 4, and 5 were collapsed to create a new response category of “*neither agree nor disagree*.” A PCM with the new response categories for the Satisfaction With Life Scale (SWLS) (i.e., “*strongly disagree*,” “*disagree*,” “*neither agree or disagree*,” “*agree*,” and “*strongly agree*”) revealed an improvement in rating scale fit. A graphical representation of the refined response scales for the SWLS is provided in Table 9. Examination of item fit for the Satisfaction with Life Scale (SWLS) items suggested appropriate infit and outfit (less than 1.33), with the exception of item 5. This item evidenced infit and outfit values of 1.61 and 1.63, respectively (see Table 11). As a result, item 5 (i.e., “*If I could live my life over I would change almost nothing*”) was eliminated in the refined instrument. Additionally, item discriminations varied substantially across items on the SWLS.

*Personal Growth Initiative Scale (PGIS)*. Examination of thresholds on the Personal Growth Initiative Scale (PGIS) revealed disordered averages among all categories (1 – 6). For example, endorsing “*mostly disagree*” did not require a substantially higher level of personal growth to endorse than “*definitely disagree*.” Consequently, categories 1 and 2 were collapsed to create a new response category of “*disagree*.” Similarly, category 4 (i.e., “*somewhat agree*”) did not require a higher level of personal growth to endorse than category 3 (i.e., “*somewhat disagree*”). As such, categories 3 and 4 were collapsed to create a new response category of “*neither agree nor disagree*.” There was also no substantial difference in trait level required for

participants to endorse between categories 5 (“*mostly agree*”) and 6 (“*definitely agree*”). As a result, categories 5 and 6 were collapsed to create a new response category of “*agree*.” A PCM with the new response categories for the Personal Growth Initiative Scale (PGIS) (i.e., “*disagree*,” “*neither agree nor disagree*,” and “*agree*”) revealed an improvement in rating scale fit. A graphical representation of the refined response scales for the PGIS is provided in Table 10. Examination of item fit for the Personal Growth Initiative Scale (PGIS) items suggested appropriate infit and outfit (less than 1.33), with the exception of item 9 (see Table 11). This item evidenced infit and outfit values of 1.17 and 1.50, respectively. Due to poor item fit, item 9 (i.e., “*I can choose the role that I want to have in a group*”) was removed. Overall, item discriminations varied substantially across items on the PGIS.

### **Comparison of Model Fit**

Following instrument refinement, model fit indices from a partial credit model (PCM) and Rasch rating Scale model (RSM) were examined for each new measure through a PCM in WINSTEPS. The PCM is a more complex IRT model because it allows thresholds to vary across items, while the RSM is considered more parsimonious because it restricts thresholds to be equivalent across items. For example, the RSM conceptualizes the measurement scale on an interval level while the PCM does not. This means that in the RSM, differences between response options are the same—the difference between a score of 4 and 6 is the same as the difference between 2 and 4. Therefore, Rasch response scales are often easier to interpret and provide better clinical utility. A chi-square difference test was employed to examine the fit between the two models in order to identify whether the partial credit model significantly improved model fit over the more parsimonious Rasch rating scale model (RSM). Results from the chi-square difference test indicated that the PCM did not significantly improve model fit over

the RSM for any of the refined instruments, *GQ-6*:  $\Delta\chi^2(8) = 15.19, p = .06$ , *SWLW*:  $\Delta\chi^2(13) = 19.25, p = .12$ , *PGIS*:  $\Delta\chi^2(7) = 6.33, p = .50$ . As a result, the more parsimonious Rasch rating scale model was retained and utilized for all subsequent analyses.

### **Examination of Item and Person Fit**

Next, item fit and person fit were examined in WINSTEPS 3.74.0 using a Rasch Scale Model. Acceptable item fit suggests that the item parameters are valid (i.e., they accurately represent how examinees respond to test items), while adequate person fit indicates that individual trait levels are valid indicators of that person's position on the latent continuum. Examination of item fit revealed that all remaining items on the *GQ – 6*, *SWLS*, and *PGIS* revealed acceptable infit and outfit statistics (i.e., they did not evidence both infit and outfit statistics above the 1.33 cutoff), and were retained for further analyses. Examination of person fit on the *GQ – 6* revealed six (4.69%) participants with an infit or outfit value above 2.00, and 19 (14.84%) participants in the sample had an infit or outfit statistic above 1.33. Person fit indices on the *SWLS* revealed 18 (14.06%) participants with an infit or outfit value above 2.00, and 28 (21.88%) participants in the sample had an infit or outfit statistic above 1.33. Examination of person fit on the *PGIS* revealed nine (7.03%) participants with an infit or outfit value above 2.00, and 15 (11.72%) participants in the sample had an infit or outfit statistic above 1.33. Given the preliminary nature of the current investigation with a limited sample size ( $N = 128$ ), persons were not eliminated from any of the instruments based on fit statistics.

### **Examination of Dimensionality**

Following examination of item and person fit, the structure of each instrument was examined in WINSTEPS to explore underlying dimensionality. In examining dimensionality, unexplained variance in the first contrast for the *GQ – 6* (Eigenvalue = 1.7 and 13.3%), *SWLS* (Eigenvalue = 1.5 and 10.2%), and *PGIS* (Eigenvalue = 1.6 and 10.9%) suggested that each

instrument was unidimensional. In other words, on average, the first contrast of each instrument explained more than 88% of the variance for each construct—providing support for a one factor structure for the GQ – 6, SWLS, and PGIS.

### **Exploring Optimum Measurement Modeling**

Next, exploratory analyses were used to identify whether or not the constructs (gratitude, satisfaction with life, personal growth initiative) were distinct from one another, given that there were strong, positive correlations among the three instruments. The items of all refined instruments were examined concurrently using an IRT Procedure (PROC IRT) in SAS. A two-parameter model (e.g., graded response model (GRM)) was utilized in both exploratory and confirmatory factor analyses presented below in order to allow for differential discrimination among factor loadings. Although the generalized partial credit model is the direct extension of the partial credit model described earlier, the GRM was utilized instead, as the generalized partial credit model is not currently available within the IRT procedure in SAS. Generally speaking, the GRM is very similar to the generalized partial credit model, as both models allow for varying discriminations across items.

First, an exploratory factor analysis (EFA) of all items was run. Examination of the scree plot and eigenvalues of the EFA indicated multidimensionality among the items, suggesting a possible 2- or 3-factor structure ( $\text{Eigenvalue}_{1\text{stFactor}} = 9.73$ ,  $\text{Eigenvalue}_{2\text{ndFactor}} = 2.53$ ,  $\text{Eigenvalue}_{3\text{rdFactor}} = 1.19$ ). Graphical representations of the EFA scree plot and variance explained is provided in Figure 1. Preliminary analysis of the rotated slope matrix of the 3-factor EFA in SAS suggested that five items (i.e., GQ-6 Item 1, GQ-6 Item 2, GQ-6 Item 3, GQ-6 Item 4, GQ-6 Item 5) loaded onto the first factor, four items (i.e., SWLS Item 1, SWLS Item 2, SWLS Item 3, SWLS Item 4) loaded onto the second factor, and eight items (i.e., PGIS Item 1, PGIS

Item 2, PGIS Item 3, PGIS Item 4, PGIS Item 5, PGIS Item 6, PGIS Item 7, PGIS Item 8) loaded onto a third factor (see Table 12). Items from each original instrument clustered together. Following an examination of item content (see Table 13), a decision was made to retain the construct names of the original researchers. As such, items comprising the first factor represented *gratitude*, while items loading onto factor two and three represented *life satisfaction* and *personal growth*, respectively.

Constructs were further examined through a Confirmatory Factor Analysis (CFA) with an oblique rotation in SAS using an IRT procedure (PROC IRT) to examine model fit. A chi-square difference test was employed to examine the fit between a 1-factor and 2-factor model. Results from the chi-square difference test indicated that the 2-factor model significantly improved model fit over the 1-factor model,  $\Delta\chi^2(1) = 220.04, p < .001$ . Overall comparative fit indices for the 2- and 3-factor model were examined to determine the most optimum measurement model. The Bayesian Information Criterion (BIC) is a fit index that places a high value on parsimony and controls for overfitting using a log likelihood function by introducing penalty terms for the number of parameters in the model. As such, models with the lowest BIC values are preferred. Inspection of the BIC fit index between the 2-factor (3417.71) and 3-factor (3371.23) model suggested that the 3-factor model was the best fitting, given that the value of the statistic was smaller in magnitude than the 2-factor fit index. As a result, the 3-factor model was retained as the optimum measurement model and utilized for all subsequent analyses. Overall CFA results replicated the EFA results.

### **Relative Contribution of Predictors to Estimated Factor Scores**

**Overview.** In the next stage of analyses, three hierarchical regression analyses were used to examine whether recovery-related practices accounted for significant incremental variance in

gratitude (see Table 16), life satisfaction (see Table 17), and personal growth (see Table 18). Each outcome was computed based on factor scores derived from the IRT modeling procedures described above. In addition to information about overall model fit and the unique contribution of the individual predictors from the final model, the hierarchical approach provides information about the incremental variance associated with relevant predictor sets. In the analyses presented, there were three predictor blocks. For each model, two demographic predictors—entered on block one—were comprised of sex and age. Two person-level covariates—entered on block two—were comprised of substance use severity and unrealistic favorable presentation. Four recovery-related predictors—entered on the third and final block—were comprised of abstinence duration, lifetime frequency of step work, home group comfort, and lifetime frequency of NA-related service. In this context, the significance of the final block suggests that recovery-related predictors offer incremental prediction of each estimated factor score (i.e., gratitude, life satisfaction, personal growth), over and above the demographics and person-level covariates. (See Table 14 and Table 15 for inter-correlations, means, and standard deviations for recovery-related predictors and estimated factor scores that were used in the hierarchical regression models.)

Given the modest sample size ( $N = 128$ ), only a few variables were include in the regression analyses to keep models as parsimonious as possible. Criterion for statistical significance for the overall models, predictor blocks, and individual predictors was set to .05. Effect size estimates for the full models, predictor blocks, and individual predictors are presented in Table 19. Effect size estimates for predictor sets are  $\Delta R^2$  estimates. Effect size estimates for individual predictors are the squares of the semi-partial correlation ( $sr^2$ ) from the final model,

which represent the incremental variance associated with the predictor in question, over and above all other predictors in the model.

**Analytical Considerations.** Among the 128 participants, 13 (3.1%) individuals did not currently have a home group. In order to retain these 13 participants in the hierarchical regression models, individuals were set to the low point on the home group comfort item. Results of the regression analyses with these participants deleted from the data file were largely unchanged from the results presented below (which included them). As such, these individuals were retained because they provided valid observations on all remaining variables and increased statistical power.

**Overall Models.** The full set of predictors accounted for significant variance in gratitude ( $R^2 = .272$ ), life satisfaction ( $R^2 = .286$ ), and personal growth ( $R^2 = .166$ ).

**Predictor Blocks.** The demographic variables—entered on the first predictor block—accounted for significant variance in gratitude ( $\Delta R^2 = .086$ ), but not for life satisfaction ( $\Delta R^2 = .047$ ) or personal growth ( $\Delta R^2 = .022$ ). The person-level covariates—entered on the second block—accounted for significant incremental variance in all models: gratitude ( $\Delta R^2 = .069$ ), life satisfaction ( $\Delta R^2 = .101$ ), and personal growth ( $\Delta R^2 = .056$ ). The recovery-related predictors—entered on the third block—also accounted for significant incremental variance in all models: gratitude ( $\Delta R^2 = .118$ ), life satisfaction ( $\Delta R^2 = .139$ ), and personal growth ( $\Delta R^2 = .088$ ).

**Individual Predictors.** One recovery-related predictor, lifetime frequency of NA step work, was a significant predictor in two models (i.e., gratitude, life satisfaction). Lifetime frequency of NA step work was positively associated with all estimated factor scores, personal growth:  $sr^2 = .017$ , life satisfaction:  $sr^2 = .045$ , and gratitude:  $sr^2 = .064$ . Sex was also a significant predictor in one of the models, with women reporting higher levels of gratitude ( $sr^2 =$



.045) relative to men. A person-level covariate, substance use severity, was a significant predictor in one of the models, suggesting individuals lower on severity reported higher levels of life satisfaction ( $sr^2 = .029$ ). One additional recovery-related predictor, comfort at one's home group, was a significant predictor in the personal growth model. Home group comfort was positively associated with all estimated factor scores, personal growth:  $sr^2 = .054$ , life satisfaction:  $sr^2 = .018$ , and gratitude:  $sr^2 = .019$ .

## Discussion

The primary purpose of the current study was to use a more sophisticated measurement approach to examine several positive psychological constructs that are readily discussed in 12-step organizational literature, but have yet to be explored in the empirical literature in the context of 12-step recovery. The current study examined the psychometric properties of four positive psychological instruments using a measurement framework in a sample of NA members. An Item Response Theory (IRT) approach was adopted to guide psychometric evaluation and measurement refinement for each instrument (i.e., GQ – 6, SWLS, PGIS), as it provides a more accurate and reliable approach to measure development than Classical Test Theory (CTT) (An & Yung, 2014). IRT approaches have been utilized for decades to improve reliability, accuracy, and efficiency of testing. Many educational tests, such as the Graduate Record Examination (GRE), are developed from IRT and Rasch modeling approaches (Weiss & Kingsbury, 1984).

CTT approaches are limited in that they rely on several assumptions that often do not hold true: (1) true scores and error scores are uncorrelated, (2) the average error score in the population of examinees is zero, and (3) error scores on parallel tests are uncorrelated. As a result, utilizing CTT approaches may result in tests with different psychometric properties across samples, including unstable factor structures. In other words, factor loadings are rarely reproduced across samples (Bond & Fox, 2007). On the other hand, person and item parameters in an IRT approach are independent of the sample, meaning that item parameters are independent of the set of examinees and their ability levels, and person characteristics are independent of test items (Hambleton, Swaminathan, & Rogers, 1991).

As opposed to CTT, IRT approaches provide test information rather than a single reliability estimate, given that an instrument may provide better information at particular trait

levels than others (Crocker & Algina, 2008). As such, IRT modeling was employed to examine the psychometric properties of existing psychological instruments that were developed using CTT (i.e., GQ – 6, SWLS, PGIS). Findings provide a guide for assisting future research in the area of instrument refinement, as well as the clinical implications of measurement refinement.

### **Measurement Refinement**

As mentioned previously, the Meaning in Life Questionnaire (MLQ) was ultimately dropped from all analyses secondary to poor psychometric properties that did not allow it to conform to an IRT measurement model (e.g., ordered Rasch-Andrich thresholds). Despite numerous refinement iterations (e.g., collapsing response options, removing poor fitting items), ordered Andrich thresholds were never achieved. Although the literature suggests that the MLQ has adequate reliability and validity and has been utilized in a 12-step sample, the measure was not developed or normed in a 12-step or substance use disorder sample. This may indicate that the MLQ ostensibly did not adequately capture the conceptual description of meaning in life in the 12-step organizational literature. Additionally, it is possible that items on the measure were not particularly salient to members of mutual help organizations, such as NA, resulting in poor test information in the current study.

All retained instruments (i.e., GQ – 6, SWLS, PGIS) required significant refinement to conform to an appropriate IRT model. In particular, examination of response scale performance (i.e., Likert scales) and individual items on the Gratitude Questionnaire (GQ – 6), Satisfaction with Life Scale (SWLS), and Personal Growth Initiative Scale (PGIS) revealed disordered Rasch-Andrich thresholds and poor item fit. As a result, all instruments required response scale refinement due to poor statistical differentiation among scale weights, such as “somewhat agree” and “somewhat disagree.” Participants had considerable difficulty differentiating among scale

weights that implied neutrality (e.g., “neither agree nor disagree) or distinguishing between response options that suggest partial endorsement of agreement and/or disagreement (i.e., “slightly agree,” “slightly disagree”). It is possible that these scale weights were not distinct enough to differentiate construct levels among participants. While Likert scales with numerous response options are usually developed to capture a variety of responses, results suggest that they are not necessarily better given that they are sensitive to nuanced measurement problems. In fact, several empirical studies suggest that Likert scales with too many options tend to be unreliable (Jacoby & Matell, 1971; Matell & Jacoby, 1972). It appears that the large number of response options on each measure in the current study became too cumbersome for respondents to use, as evidenced by the samples’ lack of endorsement of some response options entirely on several items. One plausible explanation to these findings is that the purported benefits of increasing variability in response options are outweighed by participant fatigue (Lavrakas, 2008).

Additionally, the analytical sensitivity of the scales is compromised by the fact that respondents tend to interpret the scales in different ways. In other words, what one participant may describe as “slightly agree” may mean the same, in absolute terms, as what another participant might call “slightly disagree.” This phenomenon is amplified when the number of potential responses is large, which decreases the interpretability and therefore clinical utility of findings (Jamieson, 2004; Lavrakas, 2008). As such, results of the present study suggest that researchers in measurement development or refinement reduce the number of Likert response options in order to reduce participant fatigue, increase participant interpretation of response scales, improve the overall psychometric properties of the instrument, and improve the clinical utility of measures.

Poorly fitting items were also removed from each measure. Examination of the item hierarchy on the Satisfaction With Life Scale (SWLS) suggested that item 5, “If I could live my

life over I would change almost nothing,” was ultimately poor fitting because it required substantially greater levels of life satisfaction to endorse over other items, increasing the difficulty of the item. It is interesting that despite suggestions in the IRT literature that more challenging items tend to improve item-to-person targeting, this was not the case for this item (Lavrakas, 2008). In other words, retaining this item did not improve the SWLS’s ability to measure and differentiate participants who are high on life satisfaction. On the Personal Growth Initiative Scale (PGIS), item 9 “I can choose the role that I want to have in a group” was also removed due to poor fit statistics. It is hypothesized that this item may likely measure autonomy, assertion, or internal locus of control versus personal growth.

Following the initial instrument refinement phase, the Gratitude Questionnaire (GQ – 6) contained both positively and negatively worded items. However, one reverse-coded item was removed from the GQ – 6 (i.e., “Long amounts of time can go by before I feel grateful to something or someone”) because it appeared to distort the measurement model. It is possible that participants had a difficult time interpreting or understanding this item given that it was reverse-coded. Further examination of dimensionality in WINSTEPS indicated that this reverse-coded item grouped into a separate factor entirely, suggesting correlated error. It is possible that “lack of gratefulness” is a separate construct from “gratitude,” as opposed to extremes on either end of a continuum. Additionally, it is possible that negatively worded items are inappropriate for measuring positive psychological constructs.

Results of the present study contradict earlier work in the area of scale development that indicates a preference for reverse-coded items in most summated measures (DeVellis, 2003). Originally devised as a way to minimize inattention and acquiescent responding in individuals secondary to item fatigue, measurement problems outweighed the potential benefits of the

inclusion of items that are worded in the opposite direction (Lavrakas, 2008). As observed in the present study, one of the problems is that reverse-coded items frequently produce unexpected factor structures (Netemeyer, Bearden, & Sharma, 2003), an undesirable characteristic of scales that are supposed to be unidimensional. Another problem when making a scale composed of items with opposing meanings is miscomprehension (Swain, Weathers, & Niedrich, 2008), as it is easy for respondents to misinterpret phrases that include negation. Although not a specific issue in the current study, these problems are often compounded when scales are translated for use in other languages (Wong, Rindfleisch, & Burroughs, 2003). As such, results of the present study suggest that researchers in measurement development or refinement refrain from using reverse-coded items, particularly in instruments with few items where fatigue is unlikely to play a role in participant response selection.

It is not surprising that each instrument required refinement, given that each measure was originally developed within a CTT framework and was not normed or validated in a 12-step or NA sample (instruments were originally developed using undergraduate samples). This provides support for the notion that members of 12-step organizations, such as NA, may endorse items on measures of gratitude, life satisfaction, and personal growth differently than individuals who do not have a substance use disorder. Conversely, it is also possible that similar differences would be observed should the psychometric properties of the GQ-6, MLQ, SWLS, or PGIS be examined using IRT methods in a non-12 step sample. Future studies may be able to examine this using a sample of individuals from the general population (e.g., Mturk).

As part of the measurement refinement process, an important goal of the present study was to explore the structure of each measure (i.e., GQ – 6, SWLS, PGIS) empirically using IRT. As discussed above, there is empirical support for a 1-factor structure for all measures.

Unfortunately, all of these studies relied on CTT approaches, which are sample-dependent. Consequently, the structure of these constructs may reflect error associated with the measures (e.g., content coverage of the item, non-interval level data, differences in item severity or difficulty across measures, correlated error between items, etc.) or people (e.g., sampling individuals who were low or high on these positive psychological constructs, acquiescent responding, lack of understanding of item content). Following instrument refinement, results from the current study using IRT approaches revealed a one factor structure for each measure (i.e., GQ – 6, SWLS, PGIS), supporting existing findings in the literature.

Given that there was a significant and positive correlation among the constructs, concurrent analyses of all refined measures was examined using the PROC IRT procedure in SAS. Given that the literature suggests that gratitude, life satisfaction, and personal growth are associated with positive psychological functioning, it was important to examine the construct validity of these instruments to provide better test information for future measurement refinement and development. Results provide support that gratitude, life satisfaction, and personal growth are unique and distinct constructs. Despite this analysis being exploratory in nature, it provides quantitative support for the continued use of distinct measures to identify traits levels of gratitude, life satisfaction, and personal growth in clinical samples, rather than using a single measure to identify the presence of positive psychological functioning in individuals.

### **Recovery-Related Predictors**

Following instrument refinement, secondary aims of the current study was to examine whether abstinence duration and three different recovery related practices (i.e., lifetime frequency of step work, lifetime NA related service, and comfort at one's home group)

accounted for significant incremental variance in gratitude, life satisfaction, and personal growth, over and above the effects of several demographic and person-level covariates. Entered as a block, these recovery-related predictors (i.e., abstinence duration, lifetime frequency of step work, lifetime NA related service, comfort at one's home group) accounted for significant incremental variance in all three constructs. These findings contribute to our knowledge of how different aspects of 12-step involvement may correlate with gratitude, life satisfaction, and personal growth among NA members. These aspects may be important clinical indicators of treatment progress, relapse prevention, and overall psychological well-being.

Lifetime frequency of step work was a positive and significant unique predictor of gratitude and life satisfaction, but not personal growth. It is plausible that lifetime frequency of step work is more dependent on external factors, such as social support, sponsor-sponsee relationship, or even intensity of substance use problems. Measures of gratitude and life satisfaction appear to assess external factors (e.g., "I am grateful to a wide variety of people"; "The conditions of my life are excellent") rather than self-satisfaction required for subjective feelings of personal growth (e.g., "I take charge of my life"). Given its hypothesized association with external factors, lifetime frequency of step work may play a less significant role in the development of personal growth.

In addition, comfort at one's home group was a positive and significant unique predictor of personal growth, but not for gratitude or life satisfaction. Despite home group comfort also relying on external factors (i.e., "I feel very comfortable at my home group"; "I have a strong connection to others at my home group"), it is possible that this recovery-related predictor has a special effect on personal growth that does not generalize to gratitude or life satisfaction. The



associations between this recovery-related predictor and gratitude, life satisfaction, and personal growth merits further study.

Interestingly, abstinence duration and years of NA service were not significant and unique predictors for any of the constructs. In fact, abstinence duration was negatively associated with gratitude, a finding that was unexpected. Abstinence duration implies the absence of substance use, but does not necessarily imply the presence of other life enhancing behaviors, which might have a more proximal impact on gratitude, life satisfaction, and personal growth. Additional studies should examine the impact of abstinence duration and years of service on outcomes in the context of several other recovery practices to get a better sense of its unique impact.

The pattern of results with respect to the full set of recovery practices is interesting. Although the recovery predictor block accounted for significant incremental variance for all of the constructs (i.e., gratitude, life satisfaction, personal growth), only lifetime frequency of step work emerged as a significant unique predictor in two of the models (e.g., gratitude, life satisfaction), while comfort at one's home group was a significant unique predictor in only one of the models (i.e., personal growth). In prior studies, the effects of various recovery related practices have been linked primarily with abstinence duration among individuals attending AA who are in their first year (or several years) of recovery (e.g., Cloud et al., 2004). This study focused on the positive psychological functioning among NA members whose abstinence durations ranged from 1 to 33 years. With increasing time in recovery, the various pathways to positive outcomes might become more individualized and broaden beyond core 12 step activities (DeLucia et al., 2015). At the same time, however, it is possible that frequency of step work remains a fairly persistent goal of 12 step members—making it a more robust predictor.

## **Strengths**

Given the paucity of prior work in the area, the examination of gratitude, life satisfaction, and personal growth in the context of 12-step recovery fills an important gap in the research. For one, the study is the first to examine the psychometric properties of the Gratitude Questionnaire (GQ – 6), Satisfaction With Life Scale (SWLS), and Personal Growth Initiative Scale (PGIS) within a measurement framework, as well as examine these constructs concurrently. Most importantly, the resultant refined instruments of the current study provide a reliable, valid, and efficient way to measure gratitude, life satisfaction, and personal growth.

Secondly, the empirical investigation of the role of recovery-related practices in SUDs is limited in the sheer number of studies that have been carried out, as well as by populations that have been utilized. While the majority of 12-step investigations have focused on Alcoholics Anonymous, use of NA members in the current study can assist with generalization in the current scope of research. Another strength of the current study is its contribution to gaps in the field – such as understanding recovery-related predictors of gratitude, life satisfaction, and personal growth, something that has not been directly studied before. The inclusion of more specific recovery-related practices beyond abstinence (e.g., home group comfort, lifetime frequency of NA involvement) is yet another direct strength of this study. Understanding the role of recovery-related predictors on positive psychological constructs can potentially impact not only NA, and other mutual self-help organizations, but also interventions outside of the 12-step domain.

## **Limitations**

Although the current study had several strengths—as described above—a number of limitations are worth noting. One important limitation of the current study is that there were only 128 participants, which rendered analyses informative, yet exploratory in nature. Having more participants would have increased the power and robustness of statistical tests. With more

participants, Differential Item Function (DIF) analyses among NA members with differences in stratified abstinence duration (e.g., 1-5 years clean, 6-10 years clean, etc.), as well as racial/ethnic groups could have been conducted.

In addition, although organizations like NA publish some member data, the representativeness of these data is unknown, given the anonymous nature of the organization and that random sampling procedures are not utilized in data collection. Despite obtaining a fairly heterogeneous sample with respect to abstinence duration, substance use severity, geographic region, and other characteristics that could impact engagement in 12-step recovery and eventual psychological functioning, the generalizability of the associations among recovery-related predictors and gratitude, life satisfaction, and personal growth are limited given participant selection factors.

## **Conclusions**

The role of IRT in new instrument development and refinement has grown substantially over the last decade, but few studies have refined existing measures that were originally developed using CTT to improve clinical utility. This study investigated the psychometric properties of three measures originally developed with CTT within an IRT measurement framework to provide better test information. Refined instruments for gratitude, life satisfaction, and personal growth from the current study now provide better clinical utility, given that they deliver greater reliability, validity, and efficiency over the original measures. Instrument refinement can assist providers and individuals alike by reducing the burden associated with lengthy measures, yet still provide an accurate and reliable method to identify risk factors for substance use or psychopathology. In turn, the benefits associated with measurement refinement may allow for the employment of earlier interventions by reducing issues related to instrument

specificity and sensitivity. In addition, assessment of these constructs might also guide clinicians in providing the most appropriate referrals for support networks or engage the patient in appropriate coping skill acquisition.

Additionally, recovery related practices and positive psychology in substance use treatment are areas that have gained significantly more theoretical attention in the past years, but not enough empirical focus. Following instrument refinement, this study investigated the impact of 12-step recovery-related constructs (e.g., home group comfort) in predicting gratitude, life satisfaction, and personal growth in a sample of NA members. Several recovery-related variables emerged as significant primary predictors of these positive psychological constructs, including lifetime frequency of step work and home group comfort. These findings support the notion that such peer-based support can offer prediction of gratitude, life satisfaction, and personal growth over and above other recovery-related variables such as abstinence duration. Comfort and engagement in recovery appear to be primary factors in predicting positive psychological outcomes.

The current data suggest that IRT instrument refinement is a sophisticated measurement technique that can improve the psychometric properties of measures, therefore increasing clinical utility. The role of IRT in measuring the subjective experience of positive psychological functioning is an important facet in the clinical consideration and further empirical study of the gifts beyond recovery in 12-step organizations (DeLucia et al., 2015). Further examination of mutual help organization membership using refined or newly developed measures through IRT on other outcomes, such as positive affect, hope, optimism, and other character strengths may have similar clinical significance or provide greater insight into the 12-step theory of recovery. The current study represents a bridge between mutual help organizations, measurement, and

positive psychology research. Additional work in this area will likely lead to an expanded, shared theoretical and intervention knowledge base from which mutual help organizations, measurement, and positive psychology researchers benefit.

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doi:10.1016/j.cpr.2010.03.005

## Tables

Table 1

<i>Assessment Instruments for Gratitude, Meaning in Life, Life Satisfaction, and Personal Growth</i>			
Constructs and Instruments	Number of Items	Number of Factors	Source
<i>Gratitude</i>			
Gratitude Questionnaire (GQ-6)*	6	1	McCullough et al., 2002
Appreciation Scale (AS)	57	8	Adler & Fagley, 2005
Gratitude, Appreciation, and Resentment Test (GRAT)	44	3	Watkins et al., 2004
<i>Meaning in Life</i>			
Meaning in Life	20	5	Tomich & Helgeson, 2002
Life Meaningfulness Scale (LMS)	18	4	Halaman, 2005
Meaning in Life Questionnaire (MLQ)*	10	2	Steger et al., 2006
The Daily Meaning Scale (DMS)	4	2	Kashdan & Steger, 2007
<i>Life Satisfaction</i>			
The Satisfaction with Life Scale (SWLS)*	5	1	Pavot & Diener, 1993
<i>Personal Growth</i>			
Personal Growth Initiative Scale (PGIS)*	9	1	Robitschek, 1998
Personal Growth Initiative Scale-II (PGIS-II)	33	4	Robitschek et al., 2012

*Note:* \* Included in present study. All instruments contain a Likert-scale format.



Table 2

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*NA 12-Steps*

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- Step 1 We admitted that we were powerless over our addiction, that our lives had become unmanageable.
- Step 2 We came to believe that a Power greater than ourselves could restore us to sanity.
- Step 3 We made a decision to turn our will and our lives over to the care of God *as we understood Him*.
- Step 4 We made a searching and fearless moral inventory of ourselves.
- Step 5 We admitted to God, to ourselves, and to another human being the exact nature of our wrongs.
- Step 6 We were entirely ready to have God remove all these defects of character.
- Step 7 We humbly ask Him to remove our shortcomings.
- Step 8 We made a list of all persons we had harmed and became willing to make amends to them all.
- Step 9 We made direct amends to such people wherever possible, except when to do so would injure them or others.
- Step 10 We continued to take personal inventory and when we were wrong promptly admitted it.
- Step 11 We sought through prayer and meditation to improve our conscious contact with God *as we understood Him*, praying only for knowledge of His will for us and the power to carry that out.
- Step 12 Having had a spiritual awakening as a result of these steps, we tried to carry this message to addicts, and to practice these principles in all our affairs.

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Narcotics Anonymous. (1986). Twelve Steps. In Narcotics Anonymous, *Little White Booklet* (pp. 2). Chatsworth, CA: Narcotics Anonymous World Services, Inc.

Table 3

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*Positive Psychology Constructs*

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Construct	Description
<i>Gratitude</i>	A positive emotional reaction resulting from the appreciation of what is valuable and meaningful to oneself that represents a general state of thankfulness
<i>Meaning in Life</i>	An individual's ability to find significance in the many events and experiences in their lives; an individual's intrinsic motivation to pursue long-term goals about which they are passionate and highly committed
<i>Life Satisfaction</i>	An individual's evaluation of the quality of his or her life and the emotional reaction resulting from such evaluation
<i>Personal Growth</i>	An individual's belief that change within the self is possible; an individual's intentional engagement in the process of trying to change oneself

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Table 4

*Descriptive Statistics for Gratitude Questionnaire (GQ-6), Meaning in Life Questionnaire (MLQ), Satisfaction With Life Scale (SWLS), and Personal Growth Initiative Scale (PGIS)*

GQ-6 Item	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
1 I have so much in life to be thankful for	2	7	6.69	0.70
2 If I had to list everything that I felt grateful for, it would be a very long list	2	7	6.51	0.98
3 When I look at the world, I don't see much to be grateful for*	2	7	6.25	1.21
4 I am grateful to a wide variety of people	2	7	6.32	1.05
5 As I get older I find myself more able to appreciate the people, events, and situations that have been part of my life history	2	7	6.49	0.88
6 Long amounts of time can go by before I feel grateful to something or someone*	1	7	5.74	1.67
 MLQ Item				
1 I understand my life's meaning	1	7	4.72	1.44
2 I am looking for something that makes my life meaningful	1	7	4.80	1.56
3 I am always looking to find my life's purpose	1	7	4.82	1.61
4 My life has a clear sense of purpose	1	7	4.88	1.34
5 I have a good sense of what makes my life meaningful	1	7	5.27	1.33
6 I have discovered a satisfying life purpose	1	7	4.97	1.43
7 I am always searching for something that makes my life feel significant	1	7	4.49	1.64
8 I am seeking a purpose or mission for my life	1	7	4.76	1.62
9 My life has no clear purpose*	1	7	4.27	1.86
10 I am searching for meaning in my life	1	7	5.35	1.55



SWLS Item	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
1 In most ways my life is close to my ideal	1	7	4.40	1.81
2 The conditions of my life are excellent	1	7	4.73	1.71
3 I am satisfied with life	1	7	5.05	1.61
4 So far I have gotten the important things I want in life	1	7	5.16	1.58
5 If I could live my life over I would change almost nothing	1	7	3.97	1.96
 PGIS Item				
1 I know what I need to do to get started toward reaching my goals	2	6	4.63	0.95
2 I have a specific action plan to help me reach my goals	1	6	4.23	1.24
3 I take charge of my life	1	6	4.41	1.00
4 I know what my unique contribution to the world might be	1	6	4.20	1.19
5 I have a plan for making my life more balanced	1	6	4.17	1.14
6 I know how to change specific things that I want to change in my life	1	6	4.45	1.01
7 I have a good sense of where I am headed in my life	1	6	4.39	1.02
8 If I want to change something in my life, I initiate the transition process	2	6	4.48	0.94
9 I can choose the role that I want to have in a group	2	6	4.62	0.88

*Note.* \* Indicates reverse-scored item

Table 5

*Summary of Unrefined Rating Scale Performance - Gratitude Questionnaire (GQ - 6)*

Item	Response Categories	Observed Count	Observed Average	Andrich Threshold	Item Discrimination
GQ-6 Item 1	1	0	--	--	1.35
	2	1	-1.48	--	
	3	0	--	--	
	4	1	-.79	-.14	
	5	4	.07	<b>-.66</b>	
	6	24	.72	-.49	
	7	98	2.37	1.29	
GQ-6 Item 2	1	0	--	--	1.27
	2	1	-1.48	--	
	3	4	-.21	-1.57	
	4	0	--	--	
	5	11	.45	-.06	
	6	20	1.18	.58	
	7	92	2.43	1.05	
GQ-6 Item 3	1	0	--	--	.95
	2	5	-.24	--	
	3	2	.22	.40	
	4	4	.36	<b>-.86</b>	
	5	7	.53	<b>-.36</b>	
	6	37	1.63	<b>-.91</b>	
	7	73	2.65	1.73	
GQ-6 Item 4	1	0	--	--	.94
	2	1	-.09	--	
	3	4	<b>-.27</b>	-1.74	
	4	5	.24	-.09	
	5	7	.80	.23	
	6	37	1.65	<b>-.52</b>	
	7	74	2.52	2.12	
GQ-6 Item 5	1	0	--	--	1.04
	2	1	-.79	--	
	3	2	-.73	-1.02	
	4	2	.23	.18	
	5	5	.53	<b>-.30</b>	
	6	36	1.48	<b>-.79</b>	
	7	82	2.35	1.93	

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Item	Response Categories	Observed Count	Observed Average	Andrich Threshold	Item Discrimination
GQ-6 Item 6	1	3	1.02	--	.56
	2	5	<b>.22</b>	-1.30	
	3	12	.77	-1.25	
	4	9	<b>.68</b>	.27	
	5	4	.88	1.21	
	6	35	1.92	<b>-1.20</b>	
	7	60	3.05	2.27	

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*Note.* Bold entries indicate disordered averages and/or thresholds. In Winstep, item discriminations are estimated outside of the model.

Table 6

<i>Summary of Unrefined Rating Scale Performance - Satisfaction With Life Scale (SWLS)</i>					
Item	Response Categories	Observed Count	Observed Average	Andrich Threshold	Item Discrimination
SWLS Item 1	1	11	-1.82	--	1.13
	2	19	-1.10	-2.56	
	3	9	-.45	-.44	
	4	12	-.03	<b>-.90</b>	
	5	30	.48	<b>-1.02</b>	
	6	40	1.60	.24	
	7	7	4.04	4.68	
SWLS Item 2	1	5	-2.01	--	1.09
	2	15	-1.78	-2.99	
	3	17	-.50	-.99	
	4	4	<b>-.51</b>	1.23	
	5	30	.40	<b>-1.67</b>	
	6	45	1.29	<b>.54</b>	
	7	12	2.82	3.87	
SWLS Item 3	1	1	--	--	1.13
	2	12	-2.07	--	
	3	18	-.78	-1.78	
	4	7	-.45	.31	
	5	19	-.09	<b>-1.02</b>	
	6	53	1.02	<b>-.44</b>	
	7	18	2.63	2.92	
SWLS Item 4	1	4	-3.05	--	1.10
	2	7	-2.00	-2.30	
	3	10	-.99	-1.09	
	4	15	-.42	-.45	
	5	22	-.01	.23	
	6	47	.91	.50	
	7	23	2.30	3.10	
SWLS Item 5	1	16	-1.36	--	.49
	2	20	-.84	-1.97	
	3	24	.10	-1.07	
	4	13	.49	.28	
	5	15	.69	<b>-.02</b>	
	6	27	1.61	.04	
	7	13	2.38	2.74	

*Note.* Bold entries indicate disordered averages and/or thresholds. In Winstep, item discriminations are estimated outside of the model.

Table 7

*Summary of Unrefined Rating Scale Performance - Personal Growth Initiative Scale (PGIS)*

Item	Response Categories	Observed Count	Observed Average	Andrich Threshold	Item Discrimination
PGIS Item 1	1	0	--	--	1.02
	2	4	-1.32	--	
	3	8	<b>-1.46</b>	-2.34	
	4	42	.04	-2.15	
	5	52	1.91	.68	
	6	22	3.59	3.81	
PGIS Item 2	1	4	-1.07	--	.82
	2	7	-.84	-2.45	
	3	20	<b>-.88</b>	-1.99	
	4	42	.92	-.69	
	5	34	2.20	1.52	
	6	21	3.74	3.60	
PGIS Item 3	1	1	3.57	--	.85
	2	2	<b>-3.12</b>	-2.73	
	3	20	-.78	<b>-3.27</b>	
	4	41	.32	-.48	
	5	48	2.24	1.50	
	6	16	3.97	4.98	
PGIS Item 4	1	3	-2.27	--	.91
	2	8	-1.20	-2.97	
	3	20	-.37	-1.90	
	4	45	.91	-.75	
	5	34	2.34	1.66	
	6	18	3.76	3.96	
PGIS Item 5	1	4	-1.63	--	1.26
	2	6	<b>-1.66</b>	-2.56	
	3	17	-.81	-2.25	
	4	52	.84	-1.28	
	5	35	2.59	1.65	
	6	14	4.668	4.44	
PGIS Item 6	1	1	-3.02	--	1.01
	2	4	-2.60	-3.32	
	3	15	-.56	-2.23	
	4	40	.41	-.78	
	5	52	2.14	1.31	
	6	16	3.57	5.02	

Item	Response Categories	Observed Count	Observed Average	Andrich Threshold	Item Discrimination
PGIS Item 7	1	2	-1.57	--	1.32
	2	3	<b>-2.86</b>	-2.49	
	3	14	-1.10	<b>-2.61</b>	
	4	49	.43	-1.21	
	5	44	2.37	1.59	
	6	16	4.33	4.72	
PGIS Item 8	1	0	--	--	1.06
	2	4	-1.23	--	
	3	11	-1.21	-2.86	
	4	49	.26	-2.12	
	5	47	2.20	.89	
	6	17	3.99	4.09	
PGIS Item 9	1	0	--	--	.79
	2	1	-3.23	--	
	3	13	-.86	-4.10	
	4	38	.34	-1.32	
	5	58	1.69	.79	
	6	18	3.78	4.63	

*Note.* Bold entries indicate disordered averages and/or thresholds. In Winstep, item discriminations are estimated outside of the model.

Table 8

*Refined Response Options: Gratitude Questionnaire (GQ - 6)*

Original Instrument:

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Refined Instrument:

Strongly Disagree	Disagree	Neutral			Agree	Strongly Agree
1	2	3			4	5

Table 9

*Refined Response Options: Satisfaction With Life Scale (SWLS)*

Original Instrument:

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Refined Instrument:

Strongly Disagree	Disagree	Neither Agree nor Disagree			Agree	Strongly Agree
1	2	3			4	5



Table 10

*Refined Response Options: Personal Growth Initiative Scale (PGIS)*

Original Instrument:

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree
1	2	3	4	5	6

Refined Instrument:

Disagree	Neither Agree nor Disagree	Agree
1	2	3

Table 11

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*Item Infit and Outfit for Dropped Items*

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Item	Infit MNSQ	Outfit MNSQ
GQ-6 Item 6	1.66	1.64
SWLS Item 5	1.61	1.63
PGIS Item 9	1.17	1.50

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Table 12

<i>Parameter Estimates for Each Item from the Rotated Slope Matrix</i>			
Item	Factor 1	Factor 2	Factor 3
GQ-6 Item 1	<b>5.541</b>	.406	-.253
GQ-6 Item 2	<b>4.999</b>	.864	-.026
GQ-6 Item 3	<b>1.878</b>	-.127	.072
GQ-6 Item 4	<b>2.673</b>	.243	-.031
GQ-6 Item 5	<b>1.788</b>	.439	.414
SWLS Item 1	-.020	<b>3.554</b>	-.076
SWLS Item 2	.087	<b>3.274</b>	-.015
SWLS Item 3	.828	<b>3.150</b>	.361
SWLS Item 4	.423	<b>2.351</b>	.138
PGIS Item 1	-.361	.502	<b>2.685</b>
PGIS Item 2	-.097	-.133	<b>2.458</b>
PGIS Item 3	-.115	.614	<b>2.481</b>
PGIS Item 4	.499	.154	<b>2.213</b>
PGIS Item 5	.602	-.595	<b>3.505</b>
PGIS Item 6	.182	.794	<b>2.633</b>
PGIS Item 7	.445	.897	<b>3.452</b>
PGIS Item 8	.233	.714	<b>2.482</b>

*Note.* Bolded entries (i.e., parameter with largest magnitude for each item) indicate which factor each item loads onto

Table 13

*Item Content*

## Item

GQ-6 Item 1	I have so much in life to be thankful for
GQ-6 Item 2	If I had to list everything that I felt grateful for, it would be a very long list
GQ-6 Item 3	When I look at the world, I don't see much to be grateful for*
GQ-6 Item 4	I am grateful to a wide variety of people
GQ-6 Item 5	As I get older I find myself more able to appreciate the people, events, and situations that have been part of my life history
SWLS Item 1	In most ways my life is close to ideal
SWLS Item 2	The conditions of my life are excellent
SWLS Item 3	I am satisfied with life
SWLS Item 4	So far, I have gotten the important things I want in life
PGIS Item 1	I know what I need to do to get started toward reaching my goals
PGIS Item 2	I have a specific action plan to help me reach my goals
PGIS Item 3	I take charge of my life
PGIS Item 4	I know what my unique contribution to the world might be
PGIS Item 5	I have a plan for making my life more balanced
PGIS Item 6	I know how to change specific things that I want to change in my life
PGIS Item 7	I have a good sense of where I am headed in my life
PGIS Item 8	If I want to change something in my life, I initiate the transition process

*Note.* \* Indicates reverse-scored item

Table 14

<i>Inter-Correlations of the Recovery-Related Predictors (with Means and Standard Deviations)</i>				
	1	2	3	4
1. Abstinence Duration (years)	-			
2. NA Step Work (lifetime count)	<b>.456</b>	-		
3. Home Group Comfort*	-.016	.024	-	
4. Years of NA Service (Lifetime)	.778	<b>.383</b>	.021	-
<i>M</i>	11.774	2.602	3.220	3.753
<i>SD</i>	7.828	2.705	1.085	3.042

*Note.* Bolded entries indicate clinically significant correlations,  $p < .05$ ; \*Responses were on a 4-point Likert scale: 1 (*never/almost never*), 2 (*sometimes*), 3 (*often*), and 4 (*always/almost always*)

Table 15

<i>Factor Inter-Correlations</i>			
	1	2	3
1. Gratitude	-		
2. Satisfaction with Life	.798	-	
3. Personal Growth	.574	.565	-

*Note.* All correlations were significant at the .01 level

Table 16

*Hierarchical Multiple Regression Predicting Estimated Factor Scores for Gratitude from Demographic, Person-Level Covariates, and Recovery-Related Predictors*

Variable	Gratitude Estimated Factor Scores								
	Block 1			Block 2			Block 3		
	B	$\beta$	$p$	B	$\beta$	$p$	B	$\beta$	$p$
Constant	-.381		.178	-.516		.064	-.619		.048
Age	.016	.238	.010	-.340	.246	.009	.006	.092	.376
Sex (0 = female, 1 = male)	-.323	-.217	.018	-.002	-.228	.011	-.324	-.218	.011
MMPI (Lie Scale)				.037	.101	.264	.022	.059	.503
Substance Use Severity				-.236	-.244	.006	-.156	-.161	.067
Abstinence Duration							-.009	-.091	.520
NA Step Work (lifetime count)							.080	.291	.002
Home Group Comfort							.102	.148	.092
Years of NA Service (lifetime)							.048	.197	.144

Model Summary														
Block 1					Block 2					Block 3				
$R^2$	$F$	$p$	$\Delta R^2$	$\Delta F$	$p$	$R^2$	$F$	$p$	$\Delta R^2$	$\Delta F$	$p$	$R^2$	$F$	$p$
.086	5.385	.006												
			.069	4.581	.012	.154	5.151	.001						
									.118	4.400	.002	.272	5.085	

<.001

*Note.*  $N = 128$ . The criterion for statistical significance was set to .05. Change in  $R^2$  (i.e.,  $\Delta R^2$ ) represents the amount of incremental variance accounted for by each predictor block. Change in  $F$  (i.e.,  $\Delta F$ ) is the statistical test for the significance of the  $\Delta R^2$  values.  $R^2$ ,  $F$ , and  $p$  values are unique to the model at that stage in the analysis. For example, the 'Block 2'  $R^2$ ,  $F$ , and  $p$  values indicate that the

overall model including age, sex, MMPI (lie scale) and substance use severity is significant—accounting for 15.4% of outcome variance.

Table 17

*Hierarchical Multiple Regression Predicting Estimated Factor Scores for Life Satisfaction from Demographic, Person-Level Covariates, and Recovery-Related Predictors*

Variable	Life Satisfaction Estimated Factor Scores								
	Block 1			Block 2			Block 3		
	B	$\beta$	<i>p</i>	B	$\beta$	<i>p</i>	B	$\beta$	<i>p</i>
Constant	-1.016		.126	-1.395		.031	-1.513		.033
Age	.033	.218	.020	.031	.204	.030	-.171	-.019	.853
Sex (0 = female, 1 = male)	-.233	-.068	.462	-.257	-.075	.399	-.003	-.050	.551
MMPI (Lie Scale)				.156	.184	.045	.128	.151	.088
Substance Use Severity				-.586	-.264	.003	-.404	-.182	.037
Abstinence Duration							.030	.137	.329
NA Step Work (lifetime count)							.154	.243	.010
Home Group Comfort							.225	.142	.101
Years of NA Service (lifetime)							.069	.122	.359

Model Summary														
Block 1					Block 2					Block 3				
<i>R</i> <sup>2</sup>	<i>F</i>	<i>p</i>	$\Delta R^2$	$\Delta F$	<i>p</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>p</i>	$\Delta R^2$	$\Delta F$	<i>p</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>p</i>
.047	2.821	.064												
			.101	5.292	.002	.148	4.891	.001						



.139 5.292 .001 .286 5.463

<.001

*Note.*  $N = 128$ . The criterion for statistical significance was set to .05. Change in  $R^2$  (i.e.,  $\Delta R^2$ ) represents the amount of incremental variance accounted for by each predictor block. Change in  $F$  (i.e.,  $\Delta F$ ) is the statistical test for the significance of the  $\Delta R^2$  values.  $R^2$ ,  $F$ , and  $p$  values are unique to the model at that stage in the analysis. For example, the ‘Block 2’  $R^2$ ,  $F$ , and  $p$  values indicate that the overall model including age, sex, MMPI (lie scale) and substance use severity is significant—accounting for 14.8% of outcome variance.

Table 18

*Hierarchical Multiple Regression Predicting Estimated Factor Scores for Personal Growth from Demographic, Person-Level Covariates, and Recovery-Related Predictors*

Variable	Personal Growth Estimated Factor Scores								
	Block 1			Block 2			Block 3		
	B	$\beta$	$p$	B	$\beta$	$p$	B	$\beta$	$p$
Constant	.039		.905	-.092		.776	-.473		.202
Age	.004	.055	.559	.002	.026	.785	-.008	-.104	.347
Sex (0 = female, 1 = male)	-.246	-.148	.117	-.244	-.147	.113	-.205	-.123	.175
MMPI (Lie Scale)				.075	.182	.056	.051	.124	.193
Substance Use Severity				-.171	-.158	.086	-.079	-.073	.434
Abstinence Duration							.010	.095	.533
NA Step Work (lifetime count)							.047	.152	.134
Home Group Comfort							.190	.248	.009
Years of NA Service (lifetime)							.008	.028	.845

Model Summary														
Block 1				Block 2				Block 3						
$R^2$	$F$	$p$	$\Delta R^2$	$\Delta F$	$p$	$R^2$	$F$	$p$	$\Delta R^2$	$\Delta F$	$p$	$R^2$	$F$	$p$

.022 1.297 .277

.056 3.427 .036 .078 2.389 .055

.088 2.890 .026 .166 2.720

.009

---

*Note.*  $N = 128$ . The criterion for statistical significance was set to .05. Change in  $R^2$  (i.e.,  $\Delta R^2$ ) represents the amount of incremental variance accounted for by each predictor block. Change in  $F$  (i.e.,  $\Delta F$ ) is the statistical test for the significance of the  $\Delta R^2$  values.  $R^2$ ,  $F$ , and  $p$  values are unique to the model at that stage in the analysis. For example, the ‘Block 3’  $R^2$ ,  $F$ , and  $p$  values indicate that the overall model including age, sex, MMPI (lie scale), substance use severity, and all recovery-related predictors (e.g., abstinence duration, NA Step Work, etc.) is significant—accounting for 16.6% of outcome variance.

Table 19

*Unique Effects from Hierarchical Regression Models Predicting Estimated Factor Scores for Gratitude, Life Satisfaction, and Personal Growth*

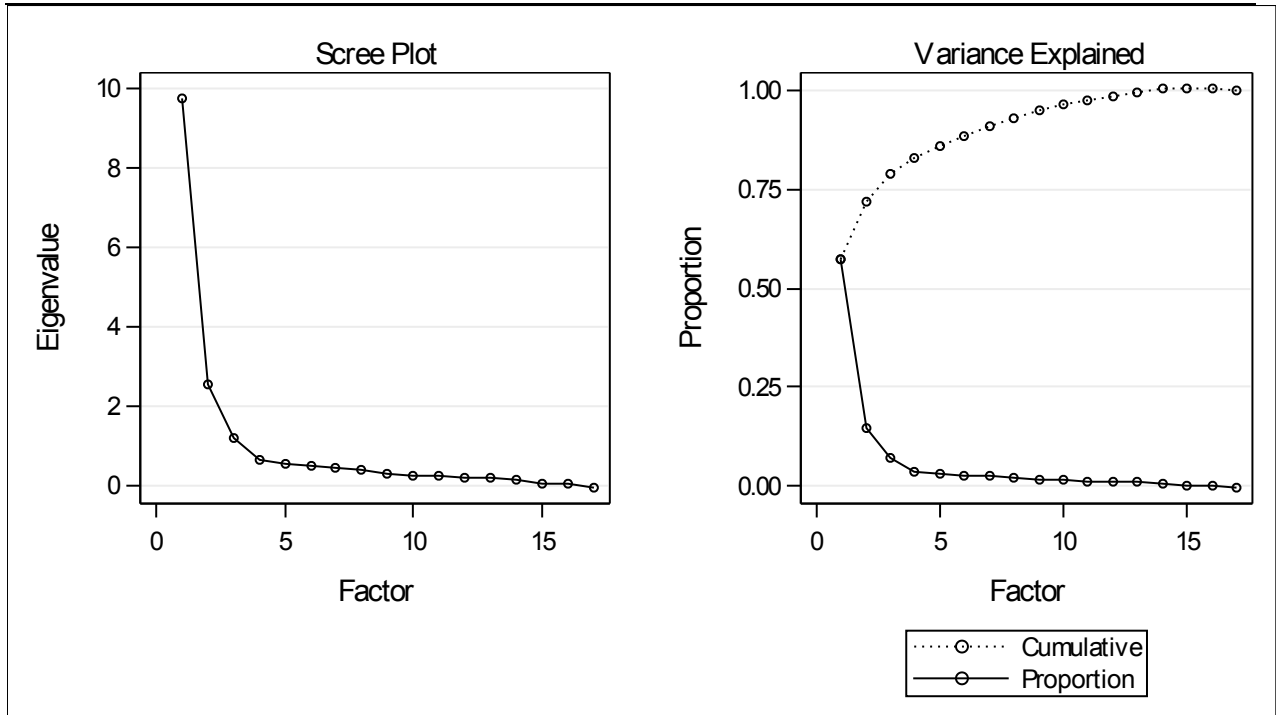
Predictors	Estimated Factor Scores		
	Gratitude	Life Satisfaction	Personal Growth
Demographics	<b>.086</b>	.047	.022
Age	.005	(-) .000	(-) .007
Sex (0 = female, 1 = male)	(-) <b>.045</b>	(-) .002	(-) .014
Person-Level Covariates	<b>.069</b>	<b>.101</b>	<b>.056</b>
MMPI (Lie Scale)	.003	.019	.013
Substance Use Severity	(-) .023	(-) <b>.029</b>	(-) .005
Recovery-Related Predictors	<b>.118</b>	<b>.139</b>	<b>.088</b>
Abstinence Duration	(-) .003	.006	.003
NA Step Work (lifetime count)	<b>.064</b>	<b>.045</b>	.017
Home Group Comfort	.019	.018	<b>.054</b>
Years of NA Service (lifetime)	.014	.006	.000
<i>R</i> <sup>2</sup> Full Model	<b>.272</b>	<b>.286</b>	<b>.166</b>

*Note.* Entries in un-indented rows (e.g., demographics, person-level covariates) are  $R^2$  change values (i.e.,  $\Delta R^2$ ) for the predictor block. Entries in the indented rows (e.g., age) are semi-partial  $r^2$  values (i.e.,  $sr^2$ ) for individual predictors from the final model. The criterion for statistical significance was set to .05 for overall models, predictor blocks, and individual predictors. Statistically significant entries are bolded. Negative signs (in parentheses) indicate a negative association between the predictor and the outcome; otherwise, associations were positive.

## Figures

Figure 1

*EFA Scree Plot and Variance Explained*



## Appendices

### Appendix A. Gratitude Questionnaire-6 (GQ-6)

Please answer the following statements.

1. I have so much in life to be thankful for.

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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2. If I had to list everything that I felt grateful for, it would be a very long list.

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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3. When I look at the world, I don't see much to be grateful for.

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	I choose not to answer
----------------------	----------	----------------------	---------	-------------------	-------	-------------------	------------------------------

4. I am grateful to a wide variety of people.

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	I choose not to answer
----------------------	----------	----------------------	---------	-------------------	-------	-------------------	------------------------------

5. As I get older I find myself more able to appreciate the people, events, and situations that have been part of my life history.

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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6. Long amounts of time can go by before I feel grateful to something or someone.

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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## Appendix B. Meaning in Life Questionnaire (MLQ)

Please take a moment to think about what makes your life and existence feel important and significant. Remember that these are very subjective questions and there are no right or wrong answers.

1. I understand my life's meaning.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
----------------------	------------------	--------------------	-------------------------------	------------------	----------------	--------------------	------------------------------

2. I am looking for something that makes my life feel meaningful.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
----------------------	------------------	--------------------	-------------------------------	------------------	----------------	--------------------	------------------------------

3. I am always looking to find my life's purpose.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
----------------------	------------------	--------------------	-------------------------------	------------------	----------------	--------------------	------------------------------

4. My life has a clear sense of purpose.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
----------------------	------------------	--------------------	-------------------------------	------------------	----------------	--------------------	------------------------------

5. I have a good sense of what makes my life meaningful.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
----------------------	------------------	--------------------	-------------------------------	------------------	----------------	--------------------	------------------------------

6. I have discovered a satisfying life purpose.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
----------------------	------------------	--------------------	-------------------------------	------------------	----------------	--------------------	------------------------------

7. I am always searching for something that makes my life feel significant.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
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8. I am seeking a purpose or mission for my life.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
----------------------	------------------	--------------------	-------------------------------	------------------	----------------	--------------------	------------------------------

9. My life has no clear purpose.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
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10. I am searching for meaning in my life.

Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True	I choose not to answer
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## Appendix C. Satisfaction With Life Scale (SWLS)

Below are five statements you may agree or disagree with. Please be open and honest in your responding.

1. In most ways my life is close to my ideal.

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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2. The conditions of my life are excellent.

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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3. I am satisfied with life.

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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4. So far I have gotten the important things I want in life.

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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5. If I could live my life over I would change almost nothing.

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree	I choose not to answer
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## Appendix D. Personal Growth Initiative Scale (PGIS)

Please answer using the following responses.

1. I know what I need to do to get started towards reaching my goals.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
------------------------	--------------------	----------------------	-------------------	-----------------	---------------------	------------------------------

2. I have a specific action plan to help me reach my goals.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
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3. I take charge of my life.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
------------------------	--------------------	----------------------	-------------------	-----------------	---------------------	------------------------------

4. I know what my unique contribution to the world might be.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
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5. I have a plan for making my life more balanced.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
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6. I know how to change specific things that I want to change in my life.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
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7. I have a good sense of where I am headed in my life.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
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8. If I want to change something in my life, I initiate the transition process.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
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9. I can choose the role that I want to have in a group.

Definitely Disagree	Mostly Disagree	Somewhat Disagree	Somewhat Agree	Mostly Agree	Definitely Agree	I choose not to answer
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