



# Positive Psychology Interventions in Medical Populations: Critical Issues in Intervention Development, Testing, and Implementation

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## Abstract

Positive psychological well-being is prospectively associated with superior health outcomes. Positive psychology interventions have promise as a potentially feasible and effective means of increasing well-being and health in those with medical illness, and several initial studies have shown the potential of such programs in medical populations. At the same time, numerous key issues in the existing positive psychology literature must be addressed to ensure that these interventions are optimally effective. These include (1) assessing the nature and scope of PPWB as part of intervention development and application; (2) identifying and utilizing theoretical models that can clearly outline potential mechanisms by which positive psychology interventions may affect health outcomes; (3) determining consistent, realistic targets for positive psychology interventions; (4) developing consistent approaches to the promotion of positive psychological well-being; (5) emphasizing the inclusion of diverse samples in treatment development and testing; and (6) considering implementation and scalability from the start of intervention development to ensure effective real-world application. Attention to these six domains could greatly facilitate the generation of effective, replicable, and easily adopted positive psychology programs for medical populations with the potential to have an important impact on public health.

**Keywords** Diversity · Implementation · Optimism · Positive affect · Positive psychology · Well-being

Positive psychological well-being (PPWB) has gained attention as an important health-related factor (Kubzansky et al., 2018; Levine et al., 2021) that is linked with superior mental and physical health outcomes (Chida & Steptoe, 2008; Kubzansky et al., 2018; Levine et al., 2021; Martin-Maria et al., 2017). Numerous elements of PPWB (e.g., optimism, positive affect, life purpose) are prospectively associated with superior health outcomes, often independent of demographic and medical variables (Cohen et al., 2016; Kim et al., 2019; Moskowitz, 2003; Petrie et al., 2018; Tindle et al., 2009). Furthermore, such

benefits have in many cases been above and beyond the adverse effects of negative psychological symptoms such as depression and anxiety, suggesting a distinct beneficial effect of PPWB on health (Kubzansky et al., 2018; Levine et al., 2021). Given the growing data about the benefits of well-being, there has been increasing attention to the health effects of PPWB from major medical organizations, such as the American Heart Association (Levine et al., 2021).

One relevant question about PPWB is whether it is a largely inherent and static trait, or whether aspects of well-being can be effectively and durably modified, especially in those with medical illness. This question could have significant public health implications. If PPWB can be modified among such patients, then interventions that successfully promote PPWB could lead to improvements in physical health.

How might PPWB be reliably modified? One promising approach is the use of positive psychology (PP) interventions (Seligman et al., 2005; Seligman et al., 2006). Such interventions utilize a systematic, deliberate process to increase PPWB through the completion of one or more activities (e.g., using personal strengths, performing

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enjoyable or meaningful activities, expressing gratitude). PP interventions have been studied in over 70,000 persons, consistently improving well-being and reducing levels of stress, anxiety, and depression (Brown et al., 2019; Carr et al., 2021; Sin & Lyubomirsky, 2009). They generally require minimal provider training and have been well-accepted by participants in numerous settings (Celano et al., 2020; Huffman et al., 2020, 2021). Over the past several years, researchers have begun to study PP-based interventions in individuals with medical illnesses to assess their ability to modify PPWB and downstream health behaviors and outcomes (Charlson et al., 2007; Huffman et al., 2021; Moskowitz et al., 2017). Thus far, they have been feasible and well-accepted (Celano et al., 2020; Hoepfner et al., 2019; Moskowitz et al., 2012) and in many cases have been associated with promising improvements in PPWB and some health behaviors or physical health outcomes (Huffman et al., 2020; Moskowitz et al., 2017; Peterson et al., 2012), underscoring their potential as a means to improve health.

However, there are several important gaps in this growing literature on PP interventions that must be addressed to move the science of well-being and health forward. These include (1) assessing the nature and scope of PPWB as part of intervention development and application; (2) identifying and utilizing theoretical models that can clearly outline potential mechanisms by which positive psychology interventions may affect health outcomes; (3) determining consistent, realistic targets for positive psychology interventions; (4) developing consistent approaches to the promotion of positive psychological well-being; (5) emphasizing the inclusion of diverse samples in treatment development and testing; and (6) considering implementation and scalability from the start of intervention development to ensure effective real-world application. Accordingly, we will discuss these issues and outline potential next steps that could allow PP interventions to have the greatest chance to meaningfully improve health outcomes in the broadest range of persons. To narrow the scope and optimize the specificity of information in this article, we have chosen to focus specifically on PP-based interventions. However, many of the identified issues also apply to other interventions (e.g., yoga, mindfulness-based interventions, tai chi, and resilience programs) that focus on promotion of well-being and health.

## Issue No. 1: Assessing the Nature and Scope of PPWB as Part of Intervention Development and Application

PPWB is a broad term that can include numerous concepts. Facets of PPWB include hedonic constructs, such as positive

affect and life satisfaction, that focus on subjective happiness and the experience of pleasure versus displeasure (Ryan & Deci, 2001). PPWB also contains eudaimonic constructs, which revolve around self-realization, personal growth, and the experience of living a full and virtuous life (Disabato et al., 2016; Ryan & Deci, 2001). Eudaimonic constructs include life purpose, autonomy, meaning, and personal growth, and they are generally considered to be distinct from hedonic components of PPWB. Finally, other aspects of well-being, such as optimism, do not fit neatly into either of these paradigms, but remain important contributors to well-being.

Thus far, there have been no clear answers to questions regarding which specific PPWB domains lead to better health. Research to identify differential relationships between hedonic and eudaimonic well-being constructs and health has yielded mixed results, with some studies and reviews finding more evidence for the health benefits of hedonic constructs and others finding more evidence for eudaimonic domains (e.g., Boehm & Kubzansky, 2012; Ryff, 2014). Indeed, nearly all PPWB elements, including positive affect, vitality, satisfaction with life, purpose in life, optimism, and gratitude, have been prospectively linked with superior health outcomes (Boehm & Kubzansky, 2012; Chida & Steptoe, 2008; Ferguson et al., 2012; Petrie et al., 2018; Ryff, 2014), and, of these, optimism—not clearly either hedonic or eudaimonic—is the construct with the greatest evidence for health benefit (Amonoo et al., 2021; Boehm et al., 2018; Kim et al., 2019). Likewise, regarding intervention studies, many existing PP interventions in medical populations have utilized activities that target multiple different PPWB aspects—hedonic, eudaimonic, and otherwise—over the course of the program, and such programs do appear to boost well-being and some health behaviors (Moskowitz et al., 2012; Moskowitz et al., 2017; Moskowitz, Cheung, et al., 2019; Huffman et al., 2019, 2021). Despite these mixed results thus far, it is so important to learn whether there are specific categories (e.g., eudaimonic domains) or single constructs (e.g., positive affect) of PPWB that are more linked to health and should therefore be the main targets of PP-based health promotion interventions. Ongoing study is needed to best identify distinct constructs that are both modifiable and clearly connected to improved health-related outcomes.

Similarly, the relationship between PPWB and social connection may be important. Social support—both objective and perceived—has been associated with superior medical outcomes (Bucholz et al., 2014; Compare et al., 2013). Some PPWB constructs and PP activities (e.g., those related to altruism) may have explicit or distinct social elements, and certain aspects of PP interventions (e.g., group-based interventions) may promote social support and cohesion. Whether social factors in the context of PP interventions play a role in their impact on medical outcomes is another key area needing further study.

## Issue No. 2: Generating Theoretical Models and Identifying Mechanisms of Effect

Utilizing and testing theoretical models is a key component in the development of any health-related psychological or behavioral intervention. While there have been robust examinations examining potential models and mechanisms by which PP interventions promote PPWB (e.g., see Lyubomirsky & Layous, 2013), there has been less study of how these interventions may promote physical health, though seminal work by Pressman and Cohen (Pressman & Cohen, 2005) and more recent work by Kubzansky et al. (2018) have proposed that changes in behavior (including health behaviors), biological processes, and social supports and ties all may link PPWB to health.

Despite limited evidence to date, existing data suggest that PP interventions have the potential to improve health. PP interventions consistently lead to increases in PPWB and related psychological constructs (Bolier et al., 2013; Chakhssi et al., 2018), and these constructs in turn are associated with a variety of beneficial proximal and distal health outcomes (Cohen et al., 2016; Giltay et al., 2004; Petrie et al., 2018; Rozanski et al., 2019). Despite these promising broad findings, and prior work examining how PPWB may promote health behaviors [e.g., the Upward Spiral Theory of Lifestyle Change (Van Cappellen et al., 2018), which postulates a self-reinforcing cycle of well-being and activity], there has been little empirical study within PP intervention trials regarding the mechanisms by which PP interventions should improve health, and many PP intervention studies in health settings have not explicitly outlined theoretical models.

Several key steps in a potential model (see Fig. 1) must be outlined to determine if—and how—PP interventions may affect health. First, it must be determined whether PP interventions effectively modify PPWB in medical settings. The vast majority of PP intervention studies have occurred in healthy persons (e.g., college students, community living older adults; Bolier et al., 2013; Carr et al., 2021), and given the mental and physical challenges associated with managing medical illness, it may not be possible to extrapolate the benefits of PP interventions in these populations to those with medical conditions. Further testing of PP-based interventions in a range of specific medical populations is required to determine whether PP interventions' benefits extend to such cohorts.

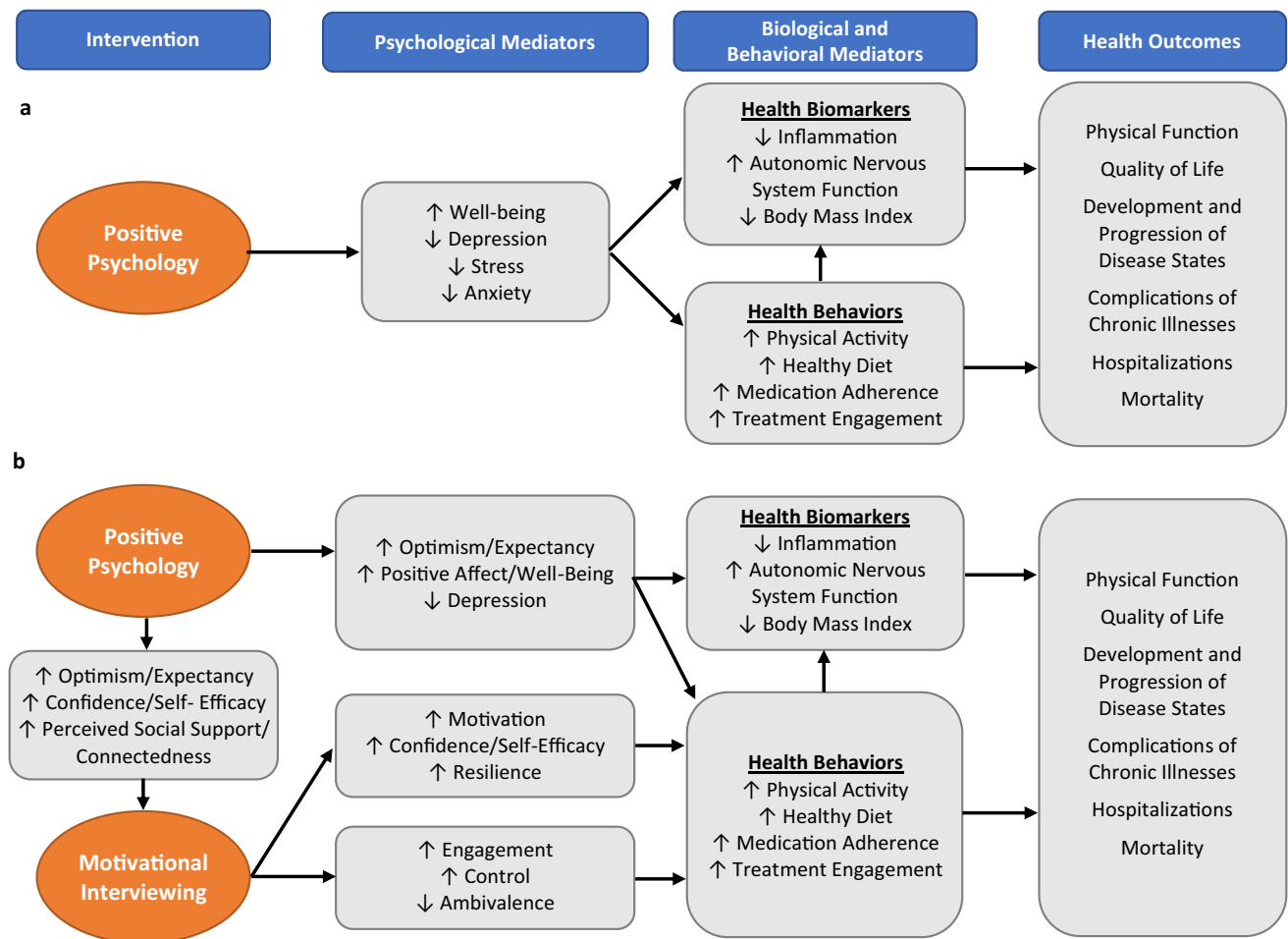
Second, if PP interventions successfully improve well-being, researchers must determine whether such intervention-induced improvements in PPWB lead to changes in intermediate mechanistic outcomes, such as biomarkers and health behaviors, that are associated with physical health. In observational studies, PPWB has been associated with improvements in health-related biomarkers that are linked to prognosis, including markers of inflammation (Ikeda et al., 2011;

Panagi et al., 2019; Steptoe et al., 2008), autonomic nervous system function (Bhattacharyya et al., 2008; Oveis et al., 2009; Raikkonen et al., 1999), lipids (Boehm et al., 2013; Soo et al., 2018), and endothelial function (Celano et al., 2017; Ikeda et al., 2011), though many of these studies have been cross-sectional, raising questions about causality. Furthermore, strong PPWB-biomarker relationships have not been identified in all such studies (Boehm & Kubzansky, 2012; Celano et al., 2017; Oreskovic & Goodman, 2013; Roy et al., 2010; Sloan et al., 2017). There have been even fewer intervention studies, with mixed, generally modest, effects of PP interventions on markers of inflammation and autonomic nervous system function (Hazlett et al., 2021; Mohammadi et al., 2020; Nikrahan et al., 2016; Redwine et al., 2016).

A second, more promising, potential mechanism by which PPWB may be related to health involves engagement in health behaviors associated with superior medical prognosis. In observational studies, PPWB has been associated with physical activity (Giltay et al., 2007; Huffman, Beale, et al., 2016), diet (Giltay et al., 2007; Ronaldson et al., 2015), smoking cessation (Giltay et al., 2007; Ronaldson et al., 2015), and medication adherence (Bassett et al., 2019; Carrico et al., 2010), with improvements in prospective and independent relationships between PPWB and health behavior engagement identified in many such studies. However, these studies have utilized a wide range of designs, covariates, and measurement of behaviors, requiring further study. Initial randomized PP intervention studies have more consistently—but not universally—found improvements in objectively measured and self-reported health behaviors (Mancuso et al., 2012; Peterson et al., 2012; Cohn et al., 2014; Huffman et al., 2019; Celano et al., 2020; Huffman et al., 2020, 2021), suggesting that this may be a promising pathway by which PP interventions could improve health.

Related to both these issues is the importance of determining whether there are distinct, specific aspects of PPWB that should be targeted (Duque et al., 2019; Moskowitz, Cheung, et al., 2021). There are two related questions regarding such constructs: (1) Which elements of PPWB are most modifiable by a PP intervention? (2) Does focusing on certain domains of PPWB that are more strongly associated with downstream health outcomes—even if harder to modify—make more sense?

For example, an intervention focused on positive affect—a dynamic, state construct (Watson et al., 1988)—may lead to greater measurable change in well-being compared to a program that focuses on a more dispositional construct like optimism. Indeed, numerous PP interventions in medical settings have led to greater positive affect (Moskowitz, Cheung, et al., 2019; Huffman et al., 2019; Huffman et al., 2020; Moskowitz, Cheung, et al., 2021), and in some cases changes in other constructs have been substantially smaller (Celano



**Fig. 1** Sample theoretical models for PP-alone and combined PP-behavioral interventions. **(a)** PP-alone, **(b)** PP-motivational interviewing. Note: There are bidirectional relationships between most constructs (e.g., being more physically active leads to positive affect)

et al., 2018; Huffman et al., 2020). In contrast, targeting optimism—if it can indeed be modified—might be an ideal approach given the strong, consistent relationships between greater optimism and major health outcomes, including lower mortality (Chida & Steptoe, 2008; Kim et al., 2017; Tindle et al., 2009).

Finally, the impact of PP interventions on the furthest downstream outcomes—the onset of medical conditions, medical events, or mortality—should be outlined. As a start, a theoretical model can utilize the existing—and relatively extensive—prospective observational data that has connected PPWB with superior health outcomes, including survival, in healthy populations and those with medical illness (Levine et al., 2021; Moskowitz, 2003; Petrie et al., 2018; Tindle et al., 2009). To date, no PP intervention study has had a sufficient sample size to assess the impact of these interventions on major health outcomes with adequate power.

Thus far, a small number of research groups have outlined tentative mechanistic models outlining how PP-based programs may affect health (Fredrickson, 2004; Hausmann, Ibrahim et al., 2018; Hausmann, Youk et al., 2018; Huffman et al., 2015;

Jenkins et al., 2021; Moskowitz, Addington, & Cheung, 2019; Zambrano et al., 2020), and Fig. 1 outlines adapted models based on programs that have utilized PP alone or have combined it with motivational interviewing, an established intervention for health behavior change; as noted, the potential mechanisms of these changes may include modification of health behaviors and changes in prognostic biomarkers (e.g., markers of inflammation). Creation of a consensus theoretical model, with further supporting evidence, can help move the science of PP intervention research forward. Such models can also facilitate the testing of mediation across the model to determine whether—and to what degree—each of the proximal and intermediate constructs may impact downstream outcomes.

Thus far, a small number of mediation analyses of PP interventions in non-medical populations have examined psychological variables' impact on downstream outcomes; one such study of a loving-kindness meditation intervention found that the intervention led to less telomere length shortening, but emotions did not mediate this finding (Le Nguyen et al., 2019). In medical settings, there has been even less use of mediation analyses of PP interventions' effects, despite the



importance of such investigations of emerging treatments; this is in part due to the relatively small samples in existing trials. One randomized trial ( $N=61$ ) of an optimism training intervention in Iranian patients with heart disease found that the intervention led to improvements in some health-related biomarkers (Mohammadi et al., 2018), with no significant psychological health behavior or psychological mediators of these relationships (Mohammadi et al., 2020). Related research does appear to suggest potential benefits of modifying positive affect in improving mental health and health behavior outcomes (Duque et al., 2019; Moskowitz, Cheung, et al., 2021), though formal mediation analyses are needed.

To move forward, it will be important to create shared, agreed-upon theoretical model frameworks using existing data and additional studies of PP interventions in specific medical populations that focus on effects of such interventions on well-being and downstream outcomes. It will likewise be critical to understand which elements of well-being are most important to target within an intervention based on their modifiability and impact on health-related outcomes. Once these models are established, their use will allow a consistent examination of intervention effects across different studies and will greatly facilitate critical mediation analyses to isolate core mechanisms of change.

### Issue No. 3: Setting Realistic, Specific Goals for PP Intervention Effect

As part of developing a consistently conceptualized intervention for medical settings, it is critical to determine what the precise goal of the intervention should be. Improving proximal outcomes is important—enhancing happiness, life satisfaction, and quality of life are worthy goals. However, for medical systems with limited resources, these outcomes alone may not be compelling enough to implement these programs in clinical care. Indeed, any intervention applied clinically comes with substantial costs, including both the opportunity cost of finite staff time that could be spent in another activity and concrete costs associated with program delivery.

As a result, those interventions that target more distal, “major” health outcomes (e.g., hospitalizations, mortality) may be preferred. If PP interventions not only improve PPWB but also impact relevant medical and public health outcomes, such as health behaviors, biomarkers, or clinical outcomes, both interest and investment in these programs would likely increase. Therefore, when studying PP interventions in medical settings, it is important to measure these health-related outcomes consistently, acknowledging that some specific outcomes in a given study will vary based on the disease population being studied and the size of the study sample.

PP intervention studies in medical settings have varied substantially in both their primary outcome variables and the other

health-related outcomes that they have examined. Many such studies have examined PPWB as a primary outcome given its proximal nature to the intervention (Moskowitz et al., 2012; Moskowitz et al., 2017; Rosenberg et al., 2021), or have targeted depression as a primary outcome (Addington, Javandel, et al., 2020; Moskowitz, Addington, et al., 2021). Others have aimed to examine quality of life (Rosenberg et al., 2021), health behaviors such as physical activity or smoking (Cohn et al., 2014; Kahler et al., 2014), sleep (Makaremnia et al., 2021), and health biomarkers (e.g., markers of inflammation; Mohammadi et al., 2018; Redwine et al., 2016).

Thus far, the beneficial effects of PP-alone interventions in medical settings on psychological outcomes have been consistently positive (Cohn et al., 2014; Moskowitz et al., 2017; Moskowitz, Cheung, et al., 2019; Rosenberg et al., 2021). In contrast, impact on key health behaviors, biomarkers, or major clinical outcomes have been somewhat modest in randomized controlled trials, with these programs having relatively limited effects on physical activity (Celano et al., 2018; Cohn et al., 2014; Huffman, Millstein, et al., 2016; Peterson et al., 2012), pain (Hausmann, Ibrahim et al., 2018; Hausmann, Youk et al., 2018; Kugler et al., 2021), and biomarkers (Hazlett et al., 2021; Nikrahan et al., 2016; Redwine et al., 2016), though one study found that performing kind acts for specific others led to changes in gene expression (Nelson-Coffey et al., 2017) and a second study found connections between positive emotions and vagal tone (Kok et al., 2013) PP-alone interventions may not be doomed to be ineffective, as it could be that the content, intensity, duration, and tailoring of such interventions need to be optimized, but thus far the evidence for PP-alone programs’ abilities to modify key downstream outcomes is not yet strong.

Additional studies have examined PP programs in combination with behavioral interventions. As one example, a series of three large studies combined a low-intensity PP intervention focused on inducing positive affect and self-affirmation with focused behavior change approaches to improve physical activity or medication adherence in people with coronary artery disease, asthma, and hypertension (Mancuso et al., 2012; Ogedegbe et al., 2012; Peterson et al., 2012). The PP intervention led to greater physical activity in individuals with heart disease but not asthma, and the program in persons with hypertension had modest but significant effects on medication adherence and no effect on blood pressure.

Other programs have utilized more intensive, multifaceted PP programs in combination with motivational interviewing and/or goal-setting, and they have been tested in several small ( $N=70$  or smaller) randomized controlled trials, typically against motivational interviewing alone or an attentional control condition, in a wide range of medical populations (Kahler et al., 2014; Huffman et al., 2019; Celano et al., 2020; Huffman et al., 2020, 2021). These trials have shown promise in terms of efficacy, with generally medium effect size impacts on health behaviors (primarily physical activity) compared to the control condition.

An additional important limitation of the existing literature is that PP interventions have only been well-studied in certain populations and formats. The vast majority of PP interventions in medical populations have occurred in adults—perhaps not surprising as the majority of medical patients are adults—and have been largely limited to specific populations, with patients with HIV, diabetes, cardiovascular disease, and cancer being best represented. Likewise, most interventions have been delivered in person or via phone to individuals, though some programs have been delivered by video, text message, and mobile app, and in groups.

Overall, further analysis of prior work could help to define realistic yet clinically important goals for PP intervention study outcomes and to consider the makeup of an intervention most likely to be effective, as discussed further below.

#### **Issue No. 4: Developing Consistent Core Components of PP Interventions to Promote Health**

As outlined in prior reviews of PP in healthy populations (Carr et al., 2021; Sin & Lyubomirsky, 2009), interventions delivered under the umbrella of PP have been widely variable, from the use of a single exercise (e.g., gratitude journaling) conducted repeatedly, to completion of a substantial series of disparate activities that relate to PPWB. To some degree, the same has been true in medical settings. Table 1 outlines examples of different PP interventions utilized in medical settings to display the range of interventions that are considered PP.

There are clearly many ways to improve psychological well-being. However, the substantial diversity of PP interventions being studied may be a hindrance to the development of a strong evidence base for a core PP intervention that can be replicated in multiple studies and implemented into clinical care. While tailoring of PP interventions to different populations has a role, it is important to establish specific, effective core intervention components to be used consistently. Developing an agreed-upon framework or set of principles, *a la* CBT, mindfulness-based cognitive therapy (Sipe & Eisendrath, 2012), or mindfulness-based stress reduction (Abbott et al., 2014), would allow for easier synthesis across studies to better understand effectiveness and mechanism, would facilitate replication studies—a critical issue in this field ("Estimating the reproducibility of psychological science," 2015; Makel et al., 2012)—and could greatly increase the probability of clinical adoption by having a clearly identified set of principles and activities upon which front-line providers could be trained. As noted, whether an optimal intervention contains PP alone or is combined with an additional intervention remains up for debate, but it seems clear that the PP elements should be as consistent and replicable as possible.

To move forward, clinical trialists will need to collaborate to decide upon shared principles and structures—with as much consistency across programs as possible—within the interventions they test. Such collaboration and cooperation will likewise be vital to conducting multisite trials that will be needed to examine effects on major clinical outcomes, which will require large samples and medical patient populations at high risk for adverse medical clinical events. Use of an agreed-upon intervention will also be important for future mechanistic studies that test and establish which components of a PP intervention are driving effects.

#### **Issue No. 5: Inclusion of Diverse Populations into Trials**

Inequitable minority representation in patient samples in behavioral intervention trials may lead to avoidable differences in health benefits among patient subgroups (Adler & Rehkopf, 2008; Erves et al., 2017; Qi et al., 2021). The field must be mindful of this potential outcome to prevent widening of healthcare disparities that can occur via new interventions that become disproportionately available and relevant to educated, predominantly White populations. An analysis of African American women in particular found that several health-compromising behaviors (e.g., emotional suppression, extraordinary caregiving, and self-care postponement) are particularly common among this population and could be improved via mind-body interventions including PP (Woods-Giscombe & Black, 2010). In order for such interventions to be effective for the unique needs of minority groups, participation of these individuals as part of intervention development studies is critical. Across all settings, the majority of well-being interventions in the USA have had limited representation of persons of color, and a recent review of 347 PP intervention studies found that 82% were conducted in Western, educated, industrialized, wealthy, and democratic countries (Carr et al., 2021). Inequitable minority representation also may lead to lower validity of PP outcome measures for minority populations, although some of these measures have been examined in certain minority populations with promising findings regarding reliability and validity (Merz et al., 2013).

Among randomized studies of PP interventions in medical settings, rates of minority inclusion in some studies have been very low (Peterson et al., 2012; Kahler et al., 2014; Celano et al., 2020; Moskowitz, Cheung, et al., 2019; Huffman et al., 2019; Huffman et al., 2020; Kugler et al., 2021). Other trials have included or focused on populations that have been historically underrepresented. These include a trial of a positive affect intervention among persons with HIV that included 56% non-White persons (Moskowitz et al., 2017), and a trial of a PP intervention for pain in osteoarthritis that included 50% African American persons (Hausmann, Ibrahim et al., 2018; Hausmann, Youk

**Table 1** Sample PP interventions that have been tested in medical populations

| Intervention   | Description  |
|--|--|
| PP combined with other techniques to target health behavior change   |  |
| Positive affect and self-affirmation induction and behavioral contracting for management of hypertension (Boutin-Foster et al., 2016)              | At an introduction session, participants were taught a positive affect induction strategy to help them focus on positive thoughts that make them feel good throughout the day, and a self-affirmation strategy to think of core values that made them proud whenever they encountered a situation that would make it difficult to adhere to medications. The intervention also included provision of a workbook about hypertension, setting a behavioral contract about hypertension medication adherence, and utilizing motivational interviewing for medication adherence. Participants received follow-up calls every other month to review progress. |
| Positive psychotherapy for smoking cessation counseling (Kahler et al., 2014)  | Six sessions of PP-based psychotherapy that consisted of three good things, gratitude letter, savoring, active-constructive responding, savoring acts of kindness, and using personal strengths. This was combined with standard behavioral smoking cessation counseling that included setting a quit date, problem-solving to manage triggers, and related strategies.  |
| Positive psychology-motivational interviewing for physical activity promotion in people with recent acute coronary syndrome (Huffman et al., 2019) | Twelve weekly phone sessions with a written manual and assigned homework between sessions. PP topics included gratitude for positive events, a gratitude letter, capitalizing on positive events, past successes, using personal strengths, acts of kindness, enjoyable and meaningful activities, and an optimism exercise. The intervention also included motivational interviewing and goal-setting for physical activity each week.  |
| PP-alone interventions   |  |
| Positive affect intervention for people newly diagnosed with HIV (Moskowitz et al., 2017)  | Five in-person sessions and one phone session in which participants learned eight behavioral and cognitive skills for increasing positive affect: noting daily positive events, capitalizing on or savoring positive events, gratitude, mindfulness, positive reappraisal, focusing on personal strengths, setting and working toward attainable goals, and small acts of kindness. They were assigned home practice to use skills between sessions.   |
| Humor training for patients with chronic pain (Kugler et al., 2021)  | Four in-person humor training sessions for hospital inpatients with chronic pain in Germany. Topics included encouraging expression of joy and cheerfulness via laughter, teaching positive effects of humor, fostering ability to see situations in humorous ways, and overcoming negative emotions that hinder humor.  |
| Promoting resilience in adolescents and young adults with cancer (Rosenberg et al., 2021)  | Four one-on-one in-person sessions that focused on managing stress, goal-setting, positive reframing, and meaning making.  |
| Optimism intervention in patients with heart disease (Mohammadi et al., 2018)  | Eight in-person group sessions that utilized 17 PP exercises aiming to promote optimism (e.g., acknowledgement and positive interpretations of the cardiac event, positively reframing life events, three good things, best possible self).  |

et al., 2018). Three large studies of a similar PP intervention were specifically developed and culturally tailored for racial/ethnic minorities (typically Black participants) in whom rates of the medical conditions being studied were disproportionately high (hypertension, overweight/obesity; Boutin-Foster et al., 2016; Ogedegbe et al., 2012; Phillips et al., 2017).

Do PP interventions appear to work as well in minority populations? The three large studies noted above found smaller improvements than several studies conducted in primarily White populations, though the intervention was also of relatively low intensity. In contrast, a recent meta-analysis of PP interventions across all settings found larger effects of PP programs in non-Western compared to Western countries, and larger

reductions in depressive symptoms in studies with a higher proportion of ethnic minority participants (Carr et al., 2021). Moderator analyses (in a single PP study of patients with HIV; Addington, Cheung, & Moskowitz, 2020) and a meta-analysis of multiple studies by the same research program (Feig et al., 2019) have examined the impact of race on the effects of PP interventions on positive emotions; both found that race did not moderate the effects of the interventions, suggesting that PP interventions may work equally well in those populations.

Overall, utilizing representative samples in research ensures that new interventions are effective and inclusive across cultural, ethnic, and socioeconomic domains. Future PP intervention development projects must continue efforts to recruit

diverse populations that replicate the makeup of surrounding communities and regions to increase the external validity and public health impact of the interventions. As part of this work, there is a need to consider how to tailor interventions to specific cultural or ethnic groups, and to provide programs in languages other than English (Hernandez et al., 2020), while also ensuring that interventions are modified with fidelity, using planned adaptation frameworks (Lee et al., 2008) to maintain the core components of a consensus intervention. Principles of community-based participatory research (Holkup et al., 2004) and frameworks of equity-focused implementation research (Eslava-Schmalbach et al., 2019) may be useful in tailoring interventions to community context and needs and in building trust in historically marginalized populations to aid recruitment efforts and address health disparities.

## Issue No. 6: Considering Accessibility and Scalability from the Start

New interventions are only useful if they are ultimately implemented beyond the research context. As a result, there is an important and increasing focus on whether and how behavioral interventions can be implemented in routine clinical practice (Atkins et al., 2017; Ross et al., 2018; Walton et al., 2020). Accordingly, from the very start of PP intervention development, it is vital for researchers to consider how these interventions can be adopted and disseminated within a healthcare system and the local population. This includes several considerations: (1) whether an intervention should be added to an existing program/patient outreach or is a wholly new clinical program; (2) which disciplines/role groups would deliver an intervention; (3) which clinical setting is most appropriate for delivery; (4) reimbursement considerations; (5) the optimal modality of delivery; (6) methods of ensuring quality, fidelity, and engagement with the intervention; and (7; again) considerations of inclusion/accessibility related to minority persons and those of low socioeconomic status.

Regarding the first three issues, the ease in training and delivery of PP interventions will hopefully allow for implementation using task-sharing approaches, decentralized from traditional mental-health delivery models, that will be less costly and more sustainable, in keeping with global health goals and recommendations (Patel et al., 2018). In the USA and elsewhere, nurses, social workers, and other clinical staff increasingly provide longitudinal care management for patients with medical conditions (Grady et al., 2000; Lee et al., 2018), and it may be possible, for example, to utilize such a program integrated into the clinical workflow of these providers. Developing clinical programs that decrease cost and/or allow for reimbursement is also important. For example, group delivery of PP interventions may be far more cost-

effective in terms of staff time and cost (though such interventions might be less beneficial than individual interventions; Sin & Lyubomirsky, 2009), and clinical groups that have health behavior or mental health components may be reimbursable. Therefore, adding PP content to such programs may provide clinical benefit while remaining billable. Text message, video-based, and mobile application behavioral interventions utilizing PP content are also being tested (Hoepfner et al., 2019; Legler et al., 2020) and may prove to be efficient and effective as alternate delivery models with larger dissemination capacity (Franz-Vasdeki et al., 2015; Labrique et al., 2018). Finally, as noted, including diverse samples when testing an intervention is vital to effective implementation to ensure sustained impact when scaled to a real-world population.

To move forward, researchers should begin with the end in mind. Initial development steps should include discussions with clinicians and patients from the start to assess integration into existing care structures and lifestyles. Studies of new interventions should incorporate and report appropriate implementation outcomes from the beginning, using standardized terminology (Proctor et al., 2013). Effectiveness-implementation hybrid trial designs (Curran et al., 2012) may also be useful for promising PP interventions to move implementation efforts forward. Finally, frameworks, such as Reach, Effectiveness, Adoption, Implementation, Maintenance (Glasgow et al., 2019), planned adaptation (Lee et al., 2008), and Practical, Robust Implementation and Sustainability Model (McCrea et al., 2019) paradigms, that focus on key implementation-related factors, such as reach, representativeness, adaptations, effectiveness (including in subgroups), potential clinical adoption, infrastructure, and contextual environment, are key in moving implementation forward in a scientific and standardized way. At each step, considerations about ever-shifting models of clinical care (e.g., increasing use of mHealth approaches) should be made as interventions move closer to clinical implementation.

## Discussion

In sum, PPWB is clearly and prospectively associated with superior health outcomes, and PP interventions are effective in promoting PPWB, making them very promising as interventions to improve health. At the same time, there remain a wide range of critical issues that should be addressed to move forward the science and clinical application of PP interventions in medical settings.

Addressing each of these issues requires careful thought and balance. For example, it will be vital to develop a consistently delivered intervention that is similar enough across studies to allow for analysis of effect across studies. Such an intervention should also have a clear, clinically relevant framework upon which clinical staff can be trained and



supervised. At the same time, there must be flexibility to allow for adaptation to different cultures, languages, and medical populations.

An additional critical issue relates to measurement of well-being. Currently, changes in well-being have largely been measured via self-report measures. Existing measures have substantial limitations, as they may measure only certain aspects of a construct (e.g., the widely Positive Affect Negative Affect Scale, which measures high-activation positive affect without considering other facets of positive affect). Such existing measures often rely on report over a long time period (e.g., 1–2 weeks) that may be difficult for most persons to accurately gauge, have not been validated in minority populations, and may not even robustly exist for certain constructs (e.g., state optimism; Moskowitz, Cheung, et al., 2021).

Likewise, focusing on mechanism and mediation are of vital importance—yet developing numerous studies focused largely on intermediate steps and understanding exact mechanism before moving ahead with large pivotal trials focused on clinical outcomes may cause substantial delay in the introduction of a “good enough” or “well enough understood” intervention to help patients now. Relatedly, intervention trials that occur in real-world settings using front-line staff will allow for external validity and rapid implementation, but making these attempts too early—before interventions have been carefully tested in more controlled settings, with more rigorously trained clinicians—may lead to null results when in fact an intervention had many good ingredients but simply needed further refinement before undergoing the challenges of a clinical implementation trial. We hope to be a part of the greater community examining the impact of PP interventions in medical settings and hope to participate in solutions to these complex issues, given the potential great benefit to patients that such interventions might provide.

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