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Content and Perceived Utility of Mental Imagery by Older Adults in a Peer-Delivered Physical Activity Intervention

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Abstract

Imagery interventions intended to increase exercise behavior are rare. The Active Adult Mentoring Program (AAMP) was a randomized controlled trial with imagery content. The purposes of this study were to examine the content and perceived utility of mental imagery with 24 AAMP participants ($M_{age} = 65.00$, $SD = 8.79$ years). Digital recordings of AAMP sessions and post-intervention interviews were content-analyzed. Emergent themes included images of the physical activity context and negative impressions about imagery. Post-intervention interviews revealed that 13 participants reported positive experiences using mental imagery while 9 would not engage in further use. Important implications are discussed.

Mental imagery is an emerging self-management tool with potential to enhance physical activity behavior. Theoretical and empirical advances suggest that mental imagery may be used to increase the frequency and intensity of physical activity for individuals across the age span (Duncan, Hall, Wilson, & Rodgers, 2012; Gammage, Hall, & Rodgers, 2000; Giacobbi, Tuccitto, Buman, & Munroe-Chandler, 2010; Hausenblas, Hall, Rodgers, & Munroe-Chandler, 1999). Exercise imagery research has revealed that regular exercisers use mental imagery more often than non-exercisers and imagery content is generally focused on appearance/health and fitness outcomes, exercise technique and routines, and the feelings or energy associated with exercise (Giacobbi, 2007; Giacobbi, Hausenblas, Fallon, & Hall, 2003; Hausenblas et al., 1999; Kim & Giacobbi, 2009). While most research in this field involves targeted, planned, and structured bodily movements, which are characteristic of

exercise behavior (Casperson, Powell, & Christenson, 1985), implications exist for all forms of physical activity including activities of daily living.

Theoretical support for the use of mental imagery in physical activity contexts can be gleaned from at least two sources: the concept of possible selves (Markus & Nurius, 1986) and self-efficacy theory (Bandura, 1986, 1997; Markus & Nurius, 1986). Possible selves is a view of self-concept that predicts a self-regulative function for visualized representations of possible future successes or failures. Possible selves are representations of the past and future that serve as incentives for future behavior. Mental imagery is a key mechanism by which individuals' possible selves get translated into self-regulatory behaviors.

Self-efficacy theory (SET) offers a framework from which to explore links between mental imagery and exercise. SET predicts that individuals derive self-efficacy expectations from enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1986, 1997). Through the process of dialog and reflection, each of these sources of self-efficacy can be targeted using mental imagery. For instance, enactive mastery experiences are the most influential source of efficacy information because they are based on direct experiences and cognitive reconstructions of these experiences. These views implicate the important role of mental imagery in how people develop and maintain self-efficacy expectations vis-à-vis memory processes.

A second form of self-efficacy information related to mental imagery is vicarious experiences. Bandura (1997) theorized that seeing or imagining oneself, or someone similar to oneself, perform a desired activity would raise efficacy beliefs. When an expert models a particular skill, retention processes linked to how the information is symbolically coded and cognitively organized have a direct impact on psychological states and performance (Bandura, 1997). The retention of skills involves an active process of transforming a memory representation, using mental images, about the execution of particular skills. Indeed, Bandura has emphasized that mental imagery is a form of vicarious experiences.

A third source of self-efficacy expectations is verbal persuasion. Practitioners who coach, train, perform rehabilitation, or offer other forms of physical guidance to individuals use verbal messages intended to enhance the efficacy of participants. While verbal persuasion is considered a weaker source of efficacy beliefs than enactive mastery experiences, it can be employed by individuals in physical activity contexts. Stimulating dialog and providing feedback to physical activity participants could trigger images associated with that behavior and lead to greater efficacy expectations.

The fourth source of self-efficacy expectations predicted by Bandura is physiological and affective states. In an exercise setting, individuals may interpret their physiological and arousal states as being prepared for a workout; negative affect from fatigue or soreness may be perceived to represent declines in fitness. Again, dialog with physical activity participants may help shape individuals' interpretations about their physiological and affective states in a positive and efficacy enhancing manner.

An observational survey-based study with older adults age 65 and older assessed relationships between mental imagery, task, barriers, and scheduling self-efficacy (Wesch,

Milne, Burke, & Hall, 2006). Participants reported using appearance and technique imagery significantly more than images of energy. However, energy imagery was the only significant predictor of task self-efficacy and mental imagery did not predict barrier or scheduling self-efficacy. These findings suggest that images of exercise linked to energy are more predictive of the mastery of exercise skills than the self-regulation of behavior for older adults.

While the above efforts are noteworthy, more interventions are needed to evaluate the impact of mental imagery on exercise and physical activity behavior (Munroe-Chandler & Gammage, 2005; Ross-Stewart, Short, & Terrance, 2010). There is also a strong need for practical and efficacious interventions intended to increase exercise behavior for individuals across the age-span. If mental imagery is proven to be an effective way to increase exercise behavior, there is enormous potential for this cognitive self-regulatory technique to be disseminated in a cost-effective manner, using various delivery mechanisms (e.g., web, phone, paper and pencil, and in-person), or as a tertiary part of an intervention strategy.

One important question not addressed in the literature is how well adult participants are open to using mental imagery as part of physical activity interventions. Published studies in other fields have shown that some individuals are skeptical and resistant towards the use of meditation, hypnosis, and other health practices outside of mainstream medicine (Bishop, Yardley, & Lewith, 2007; Furnham, Vincent, & Wood, 1995; Nichol, Thompson, & Shaw, 2011). Given the similarities between mental imagery, meditation, and hypnosis (e.g., cognitive constructions of events in one's mind), it is possible that some adults may not be open to the use of mental imagery intended to increase exercise behavior. Such resistance would limit the overall effectiveness of imagery interventions. This study will provide insights into the acceptability, openness, or resistance towards the use of mental imagery by older adults who completed a physical activity intervention.

The Active Adult Mentoring Program (AAMP)

The present study represents secondary data analysis for a recently reported randomized controlled trial. The Active Adult Mentoring Program (AAMP) was a community-based randomized controlled trial that tested the impact of peer volunteers as delivery agents in a community-based, group-mediated, physical activity intervention with sedentary adults aged 50 and older (Buman et al., 2011). The AAMP was based on social-cognitive and self-determination theories (Bandura, 1997; Deci & Ryan, 1985) whereby mentors were trained to facilitate group meetings intended to support the important constructs in both theories. Participants were randomized to one of two 16-week, group-based study arms: (1) peer-delivered, theory-based support for physical activity behavior change; or (2) peer-delivered health education. Both arms received basic education about physical activity, a gym membership, and a pedometer for self-monitoring. Peer mentors in the theory-based support arm facilitated discussions about goal setting, overcoming physical activity barriers, encouraging the development of support networks, and the use of mental imagery. Results showed significant increases in moderate and vigorous physical activity (MVPA) with participants in both groups at the end of the intervention (16 weeks); however, those in the theory-based support arm reported greater maintenance of physical activity gains at long-term follow-up (18 months).

Throughout the AAMP intervention, digital recordings of all group sessions (including those sessions discussing mental imagery) were conducted. Post-intervention interviews were conducted with participants in the theory-based support arm to evaluate their experiences in the intervention with specific questions focused on the use of mental imagery during the trial. The purposes of this study were to examine the content of AAMP participants' imagery during group intervention sessions and perceived utility (positive and negative evaluations of the imagery material) with participants assigned to the peer-delivered physical activity support condition. No hypotheses were put forth due to the exploratory nature of this study.

Method

Participants

Data sources analyzed for this study were digital recordings of (a) mentor-facilitated group meetings; and (b) post-intervention interviews of participants. Forty-one participants were randomized and received at least one session of the peer-delivered physical activity support condition; 83% completed the 16-week intervention ($n=34$). Study completers were not statistically different from non-completers on all demographic variables ($ps > .10$). Among the 34 completers, 24 participants completed a post-intervention interview. The remaining 10 participants were either (a) absent during the final AAMP meeting when recruitment for the interviews occurred or had scheduling conflicts ($n=5$); or (b) were in the final AAMP replicate which was not offered the opportunity to be interviewed because the research team observed redundancy in the previous interviews ($n=5$). The sample of post-intervention interview participants were 21 female and 3 male adults ($M_{age} = 65.00$, $SD = 8.79$ years) with an average body mass index of 27.96 ($SD = 6.51$). A majority of the participants were Caucasian ($n = 22$) with 1 African-American and 1 individual who indicated "other" with regard to race/ethnicity. Regarding education, 19 participants had an Associate's Degree or higher, 3 received vocational training, and 2 possessed a high school diploma. Additionally, 8 participants had a Master's Degree while 2 earned doctoral degrees. All participants were inactive at the start of the intervention as defined by not meeting current recommendations for engaging in 150 minutes of moderate to strenuous physical activity each week.

Mental Imagery Intervention Content

There were 7 AAMP mentors who completed 4 hours of training focused on facilitating group conversations about physical activity behavior, developing support networks, overcoming barriers to physical activity, and the use of mental imagery. All AAMP sessions were audio-tape recorded in order to provide feedback to mentors. The average age of the mentors was 67.29 ($SD = 4.19$) years, all were Caucasian, and all but 1 were male.

The content of AAMP meetings 5, 6, and 7 focused on mental imagery. Prior to these meetings, participants were asked to read a training manual that provided basic information about mental imagery (i.e., definition, use of all five senses, vividness, controllability). Each meeting began with a discussion about the participants' recent efforts to meet their physical activity goals. The first imagery-focused meeting was conducted after participants read about ways to use imagery and how it can be applied to enhance physical activity motivation and behavior. This meeting also included the peer mentor implementing a guided imagery

activity with participants. The training manual included the following definition of mental imagery:

Mental imagery can be defined as using all five of your senses to re-create an experience you have had or to actually create an experience you desire to have. We imagine things all the time. Daydreaming is a kind of mental imagery. Recalling a fond memory is another form of mental imagery. Think about the first time you saw your child or grandchild. Can you picture that moment in your mind? In addition, imagery may involve “seeing yourself” as you want to be, doing some activity or performing a skill you hope to achieve...a healthier or fitter you.

The second imagery-focused meeting was preceded by a reading that provided information about the use of mental imagery with examples and strategies to create vivid and controllable images (e.g., incorporating sensory experiences). This was coupled with a guided imagery activity where participants were requested to close their eyes and imagine a specific barrier that frequently prevented them from exercising. Participants were then instructed to imagine how they would overcome this barrier, visualize a physical activity session, and experience the feeling of accomplishment from overcoming this barrier. This activity was followed with a group meeting where participants discussed their experiences performing this activity.

A third imagery-focused meeting was conducted after participants completed and scored an earlier version of the Exercise Imagery Inventory-Revised (Giacobbi et al., 2010). The EII-R consists of five theoretically derived subscales that measure exercise technique, routines (cognitive imagery), fitness and health outcomes, feelings associated with exercise, and images of self-efficacy (motivational imagery). Respondents are asked to rate the frequency of imagery use on a scale of 1 (*Never*) to 7 (*Often*). Participants were asked to reflect on their experience completing and scoring this measure during the third AAMP meeting focused on mental imagery. Completion of the EII-R was intended to stimulate discussion amongst participants during meetings but data from this survey was not retained for further analysis. AAMP group sessions facilitated by mentors were audio-tape recorded with statements focused on mental imagery transcribed verbatim.

Post-Intervention Interview Procedures

The post-intervention interviews were completed in order to evaluate participants' overall experiences in the intervention and their views about using mental imagery. All post-intervention interviews were conducted individually by the second author and digitally recorded with participants randomized to the peer-delivered theory-based support arm. An interview guide was used that included questions focused on the intervention as a whole and the use of mental imagery. The four questions focused on mental imagery were the following:

1. Tell me about your experiences using imagery in the last 16 weeks.
2. Was it [imagery] helpful for you?
3. If so, why did you think it [imagery] was helpful?

4. Do you plan to continue using imagery?

The audio-taped interviews were designed to last approximately 30 minutes, but varied based upon the participant responses. Probing and follow-up questions were used in order to elicit clarity or additional information from participants. The sixth author transcribed only portions of the interview text focused on mental imagery.

Data Analysis

Transcriptions from AAMP meetings and the post-intervention interviews resulted in 51 and 24 pages of text respectively. The transcriptions were content analyzed and coded using inductive and deductive approaches (Hsieh & Shannon, 2005; Miles & Huberman, 1994). Two primary coders read and coded the transcriptions from the intervention meetings and post-intervention interviews. Coders included the first and sixth authors for the post-intervention interviews while the first author and a student volunteer completed coding for the transcribed AAMP meetings. In order to allow new insights to emerge, the inductive analysis began with line-by-line reading of the interview transcripts leading to the development of unique conceptual categories. Inductively derived emergent themes served as discussion points between the coders and when unique quotes were observed discussion between the coders were conducted until consensus emerged. The deductive portion of the data analysis used previously identified categories of mental imagery observed from psychometric analysis of the EII-R (Giacobbi et al., 2010). These preconceived categories included exercise technique, exercise routines, appearance and health outcomes, exercise self-efficacy, and emotions associated with exercise. The coders made notes of verbatim quotations that were unique units of analysis (e.g., paragraph, sentence, single word, or verb phrases) and conveyed a single meaning, concept, or idea (Hsieh & Shannon, 2005; Miles & Huberman, 1994). Content within each of the coded categories (themes) were compared using thematic analysis and bracketed into tables organized according to the major categories of exercise-focused mental imagery and emergent themes. Inter-coder agreement was 90% and 100% for the AAMP peer mentored meetings and post-intervention interviews, respectively. The 10% disagreement of the coded quotations was discussed until consensus emerged.

Results

The content analysis of peer-mentored intervention sessions resulted in 68 units of information. For the deductive analysis, the five previously identified categories of exercise imagery accounted for 79% of the coded responses. The inductive analysis resulted in four emergent themes that accounted for 21% of the responses and included exercise context, negative views about imagery, positive experiences with imagery, and dissociation from pain.

Appearance—Images about one's appearance accounted for 20% of the coded themes. These coded quotations were characterized by participants imagining themselves losing weight or a time in the past when they were thinner, fitting into old clothes, and a hoped for physique. For instance, during an exchange between two female participants one stated "I have clothes in my closet that I want to try on ever so often and I imagine myself back in

them.” In reply, another participant said “Or you imagine yourself at a specific event wearing them.” After scoring the EII-R during the group mentor meeting, one participant shared her views about scoring low on the appearance subscale, “I had always heard it used for your appearance and I’m kind of low on that because that [is not] my concern at all.” Another participant shared her views about imagery after scoring the EII-R by stating “I feel it’s really being beneficial and I imagine it, that’s the big one. What I’m gonna look like if I ever get skinny.” Another participant offered the following quotation: “I can just see myself running and getting stronger and healthier and becoming more firmer, liking me a lot better, eliminating weight that may cause high blood pressure or diabetes. Just fixing my mind on a healthier better [me].”

Exercise Technique—Images of exercise technique accounted for 19% of the 68 units of information. Images of exercise technique involved visualizing proper form on different pieces of exercise equipment. One participant shared the following during a group imagery activity:

I was imaging doing the abdominal crunch where you get back there. And I was just visualizing my body coming up. I didn’t hear any noise or smell anything, except I did feel. I was wet, I felt my shirt against my body and my hair all wet, but it [my images] felt good.

The same participant talked about the benefits of imaging exercise technique. She stated “I visualized this because a lot of people exercise incorrectly and when you visualize it you can see yourself doing it correctly.” Another participant shared her imagery associated with tumbling:

You know what I was saying about tumbling? You said picture myself doing something I hadn’t been doing it in years...I want to tumble...tilt my head under and tumble but I know I can’t do it right now, but I see myself doing it.

Exercise self-efficacy—Images that were intended to build self-efficacy expectations accounted for 15% of the coded responses. The content of these images frequently involved successfully completing a workout (“I was doing the treadmill and I was trying to get the incline up and seeing myself going and going fast and hard”) and were closely linked to feelings of pride and excitement. One female participant described her images and the sense of accomplishment she felt about walking after a mentor facilitated guided imagery session with peers. This quote was coded under self-efficacy because the guided imagery activity facilitated by the AAMP mentor allowed her to re-experience a sense of accomplishment from walking.

When I walk or do any exercise, it’s always a good feeling for me. I feel like I am accomplishing something and uh, yea I just walked further in the neighborhood instead of going back the way we usually do. We went up another street and came back.

Another participant described her images of receiving support from other people in a fitness facility. She stated,

Mine [imagery] was in the afternoon. It was in the gym and I was on the treadmill and I could just see everybody in there, you know so clear and all the nice people in there, they've all been encouraging to me and helping me with the machines.

Exercise feelings—This theme accounted for 13% of the coded responses and included emotions associated with exercise-focused mental imagery and physical sensations. For instance, one participant stated “I can visualize myself through some of the pain that I sometimes feel and get through it.” Another participant shared the following after completing the EII-R during which she reflected on how music impacted her motivation.

I have tried a little of visualization. I try to trick myself. I usually listen to specific tapes and songs and the ones that are fastest I can close my eyes and hear those songs and I always can speed up during those particular selections.

Exercise routines—This theme accounted for 12% of the coded themes and was characterized by images of routines associated with physical activity behavior. One participant who appeared to be skeptical about the use of appearance imagery stated “I can certainly see using it [imagery] for routines and for technique, you know once you learn how to do it and I find that I do that with my physical therapy exercises.” Another participant stated “If you have a routine and you have a set of exercises that you do, you just do them and you imagine yourself doing it and you make it routine.” Finally, the following quote reveals how one participant used imagery to visualize how and when exercise fits into a daily routine:

I actually visualize myself exercising in the morning every day at that time, then that's the mental conditioning and it's going to help me because I've already told myself and this an example: I'm going to wake up every morning at 7:00 or 5:00 and when I told myself that, that's exactly what time I wake up.

Exercise context—This emergent theme accounted for 12% of the coded themes and was characterized by reported images of walking in the neighborhood and the exercise environment. For instance, one participant shared the following experience after the mentor facilitated an imagery exercise: “The only queer thing about my visualization is that instead of staying in a lane, I went around the edge of the pool.” Another female participant shared her images of walking in the neighbor she lived: “I was walking through our neighborhood. It was 7 o'clock in the evening. It was just nice and comfortable. And people were out walking their dogs, a lot of people, smell the flowers.”

Negative views—Accounting for 4% of the coded themes, negative views about exercise-focused mental imagery was another novel finding in this study. This theme was characterized by skepticism, resistance, or negative views about the use of imagery during the intervention. For instance, one female participant stated “I just don't get what this is all about” even after reading some educational handouts included in the intervention content. The following quotation from another female participant demonstrates her difficulty understanding the use and value of mental imagery.

You know it's kind of a weird line. When I'm on the machines I try to think about breathing but as far as picturing myself doing it I'm having trouble getting the concept when I'm actually doing it... maybe I'm not understanding it because I have no trouble doing it. I plan the sequence because I want to alternate the stress on the legs and the stress on the chest, but I'm having trouble. I'm not imagining it. I go home and take my blouse off and see how my arms are sagging. That's not imagining; that's looking. I'm just thrilled with the results but I'm just not getting the concept of imagining other than coordinating the breathing with the exercise.

Positive experiences—Other participants were enthusiastic about imagery and shared their experiences using exercise focused imagery for sleep, physical therapy routines as described above, and during the career of a retired psychologist. This theme accounted for 4% of the codes during the peer-lead AAMP meetings. The following participant shared insight about her struggles and eventual positive experience with imagery:

I have been using imagery. I used to have trouble. Well I still get up a couple times during the night and I'd lay awake after being awake for an hour at a time. I'd try to think of all these things to do. I'd count cars and different names of things and nothing worked. Then I used this [imagery] last week for the first time. I imagined myself sound asleep and it worked! I would go to sleep in 15 minutes.

The former practicing psychologist used imagery during her professional career but not in the exercise context.

I believe in imagery. I think it's very, very good for one's mental health to be able to image and relax. It's a practice thing and ...I think it's something that you learn and you can relax your body if you learn to do it. But you don't automatically know how to do it.

Disassociation—This theme accounted for 1% of the coded themes and was best represented by the following quote:

I use dissociation. I've got arthritis in my left foot, the top of that foot and it hurts all the time...I just dissociate, say the pain is not there. I just imagine it not being there and I get used to it and it doesn't bother me.

Another participant stated "I can visualize myself through some of the pain that I sometimes feel and get through it."

Post Intervention Interviews

Analysis of the post-intervention interviews resulted in 48 units of information. Results revealed that 13 participants viewed mental imagery to be a helpful part of the overall intervention and they would continue using this skill while 9 felt it was not helpful and they would not continue using this cognitive technique. The reasons participants cited for not wanting to continue using imagery included "I don't really use imagery in my lifestyle" and this part of the intervention being a "non-factor." The remaining two participants did not discuss imagery due to time constraints during the interviews. Two of the 9 individuals who did not view imagery as helpful were male: the third male made no mention of imagery

during the interview which was cut short due to time constraints. The inductive analysis revealed four emergent themes: 1) positive experiences using imagery; 2) negative views; 3) previous imagery experiences; and 4) comments about mentors.

Positive experiences—The 13 participants who viewed mental imagery as an important part of the intervention shared a variety of positive experiences. One female participant stated “I liked the imagery we did” while another woman stated “I definitely think that imaging made a difference to me.” One of the male participants shared the following: “I think that anyone that wants to be physically fit tries to imagine themselves in that improved body.” Other participants offered specific examples of how they used imagery in the following quotes: “Well yea part of it is just imagining myself walking along, good posture, just feeling confident,” and “I would visualize how it felt when I was walking on the treadmill.”

Negative views—One participant’s negative experiences reflected frustration that the mental imagery part of the intervention was not intensive enough. She stated “I found it frustrating simply because I know the power of doing the images and I felt like we were not fully getting into it.” Another participant shared the following:

I can understand that for some people it [imagery] worked. But mental imagery no, for me it wasn’t working. And the whole idea of mentally imagining yourself on a nice walk on a nice day...I can’t get there. No that’s not going to help me a bit.

Another participant was not sure if and how imagery was going to help her. She stated,

I didn’t find that it [imagery] was helpful. I mean I could sit there and think of things, but I didn’t know how it was going to help me. I didn’t do it with the exercise and I really didn’t do it with anything else. I had a difficult time concentrating and maybe that’s why I couldn’t imagine as much as possible.

Other participants indicated they did not understand why they were performing imagery (e.g., “We spent a lot of time on imagining and [I] never really had a good concept of it.”) or they became bored during the mentor facilitated meetings (e.g., I think everybody, for the last couple of weeks was getting kind of bored with doing the visualizations).

Previous experiences—Previous experience using mental imagery was noted by two participants. The following was shared by an individual with certification in hypnosis:

I’ve used it for 35 years. I used it in my study by teaching people how to relax and lower their blood pressure. I had hypnosis training [and] I’ve had other experiences where I’ve seen the importance of it.

Another individual talked about other experiences using mental imagery in the following quote: “I can imagine what a room looks like when I redo it or a flower garden.”

Comments about mentors—Similar to the quote above reflecting a participants’ frustration about not having an intensive enough experience using mental imagery, two participants noted that their mentor was not enthusiastic about mental imagery or did not present the material in an effective manner. The following quote illustrates how the mentor’s

approach to implementing mental imagery impacted her experiences using this skill during the intervention.

Lisa [the mentor] was not comfortable [with imagery]...she wasn't comfortable with it [imagery]. It was kind of a mixed thing because I think it's a good part of the study but I just didn't feel like...it wasn't facilitated real successfully.

Discussion

We examined the content and perceived utility of mental imagery used by older adults as part of a recently completed peer-delivered physical activity intervention (Buman et al., 2011). We found that 13 of the 22 participants were enthusiastic about their use of mental imagery to enhance physical activity behavior while the remaining 9 indicated that they did not perceive any benefit for themselves and would not continue using this technique. These results suggest that a carefully designed intervention with mental imagery content targeting physical activity behavior was acceptable for many of our research participants. Several theoretical, measurement, and practical implications are gleaned from this study that may guide future research applying mental imagery to enhance the physical activity behavior of older adults.

Interview results revealed that a majority of our sample, mostly women, had positive experiences using theoretically and empirically supported mental imagery content (Duncan et al., 2010; Giacobbi et al., 2003; Giacobbi, 2007; Munroe-Chandler & Gammage 2005) focused on physical activity behavior. Applications of mental imagery in AAMP included informational readings, use and interpretation of an exercise imagery measure, group discussions about using mental imagery, and guided imagery activities focused on physical activity behavior. Importantly, mental imagery content, as part of the other aspects of the AAMP intervention, was administered by older adults serving as mentors who largely volunteered their time. These results are important given the overall success of the AAMP intervention for promoting long-term maintenance of physical activity behavior and because peer-assisted interventions have tremendous potential for wider dissemination and translation in physical activity and public health contexts (Castro, Pruitt, Buman, & King, 2011). With some caveats noted below, further applications and empirical tests of mental imagery with older adults in physical activity settings are warranted. Likewise, peer delivered interventions using mental imagery can be implemented in community and clinical settings.

Another important finding was that even with the use of empirically supported imagery content, mental imagery was not accepted by several participants as demonstrated during meetings lead by the peer mentors and the post-intervention interviews. Our results showed there are clear differences in adults' readiness, openness, and acceptability towards the use of mental imagery as some participants were resistant or skeptical about the potential for imagery to impact their behavior. This is important because imagery interventions may not be effective with adults who are skeptical or resistant towards imagery. Therefore, understanding the nature and impact of adults' resistance toward the use of exercise-focused mental imagery is important for effectively tailoring future imagery interventions intended

to increase physical activity behavior. Our results showed that adults' previous experiences, or lack thereof, may have been a factor that impacted participants' level of enthusiasm or skepticism towards mental imagery. This was demonstrated by several participants who had previous experience using mental imagery as part of training in hypnosis and psychology and these individuals were very enthusiastic about mental imagery. The quotes shared by other participants indicated their skepticism about mental imagery. Post-intervention interviews revealed that mental imagery may not have been explained clearly or justified strongly enough by mentors. Other participants did not consider mental imagery to be an important part of the intervention. Future researchers should prepare for the possibility that some older adults may not be open to the use of mental imagery in exercise interventions. It might be prudent to provide examples about how others use imagery to relax, fall asleep, or enhance athletic performance. For instance, the sport world is replete with examples of athletes using mental imagery, which, if appropriately presented to physical activity participants, may help individuals embrace this skill. Tailoring strategies for those who are skeptical about using mental imagery are strongly needed but there is little guidance in the extant literature about precisely how this can be accomplished.

Although some participants were skeptical about the use of mental imagery in AAMP, they may have engaged in mental imagery informally during each meeting simply by discussing their exercise goals and barriers toward goal achievement. Indeed, every meeting began with a discussion about participants' physical activity behavior in relation to their stated goals. Given the close association between verbalizations and mental imagery documented in cognitive psychology (Paivio, 1985), it is likely that simply discussing individual efforts toward goal achievement would elicit mental imagery. Therefore, one tailoring possibility for those who are skeptical about mental imagery may be to engage individuals in discussions about their exercise or fitness goals which should, theoretically, elicit mental imagery.

Because the use of mental imagery to increase physical activity behavior is novel, we drew upon findings from the complementary and alternative medicine (CAM) literature for further interpretation about why some participants were resistant and skeptical about mental imagery. Consistent with our findings, research has shown that some are skeptical about the impact of CAM on health and behavior (Bishop et al., 2007; Furnham et al., 1995; Nichol et al., 2011; Thomas, Nicholl, & Coleman, 2001). For instance, Furnham and colleagues suggested that potential and actual users of CAM may be viewed as three different groups: (a) those who are frustrated with traditional medicine, (b) opportunists who tend to shop around, and (c) those who believe in CAM. In a systematic review of the literature, Bishop et al. (2007) observed that CAM users often want to participate in medical treatment decision-making, believe that psychological factors are important in the development of illness and overall health, have an active coping style, and believe they can control their health. One qualitative study showed that amongst families using CAM, mothers tended to show philosophical congruence with CAM use and were committed users while fathers and younger people were more skeptical and believed that certain forms of CAM relied on placebo effects (Nichol et al., 2011). Our results were consistent with these findings since 2 out of the 3 male participants did not embrace mental imagery while many, but not all of the imagery enthusiasts, were women and highly educated.

The importance of the mentors in delivering the imagery content was noted by two participants who were dissatisfied with the “intensity” of engagement with imagery or the way it was presented during the meetings. Again, the CAM literature suggests that practitioners should implement mental imagery in a way that is engaging and interesting to participants. Extrapolating these findings to this study would suggest that some mentors communicated the reasons, nature, and rationale for imagery use more effectively than others. Indeed, informal analysis of the mentors’ statements during AAMP meetings showed that all but one mentor displayed enthusiasm and appropriately conveyed the content of the intervention. Likewise, the two participants who expressed a desire for additional information or a more intensive application of mental imagery worked with the single mentor who appeared to not understand the use of mental imagery. These findings suggest that having properly trained and enthusiastic mentors as imagery intervention delivery agents is crucial to helping participants understand and use mental imagery in exercise settings. It may also be prudent for researchers and practitioners to elicit the help of participants for input into the content and nature of physical activity imagery protocols. This could be accomplished by working with participants in the design of guided mental imagery scripts.

Our results shed light on shortcomings with current measures of exercise-focused mental imagery (Giacobbi et al., 2005, 2010; Hausenblas et al., 1999). From a measurement standpoint, the emergent themes described here reinforce previous discussions (e.g., Munroe-Chandler & Gammage, 2005) that some exercise imagery instruments lack important domains of this construct. For instance, instruments developed by Hausenblas et al. (1999) and Giacobbi et al. (2005) do not include subscales that assess exercise strategy, routines, or the physical activity context. The EII-R does include an exercise routines subscale but lacks a subscale focused on images of the exercise or physical activity environment (Giacobbi et al., 2010). This omission most likely leads to attenuated or underestimated relationships between mental imagery and other psycho-social constructs including exercise behavior. Future researchers should consider these issues in scale development or correlational studies in order to more accurately understand associations between mental imagery and important outcomes.

From a theoretical perspective, the quotations shared by many of the participants who perceived mental imagery to be beneficial appear to support self-efficacy beliefs. For instance, several quotations from participants using imagery during AAMP sessions reflected participants re-experiencing satisfying exercise experiences and thereby supporting vicarious experiences as a source of self-efficacy. Experiencing the feelings associated with exercise behavior during the use of mental imagery was reflected by quotes reflecting a sense of accomplishment after imagining the completion of a difficult workout. All of these imagery experiences were facilitated by mentors who may have stimulated images that tapped into vicarious experiences as a source of self-efficacy. These results are consistent with correlational findings showing associations between exercise focused mental imagery and self-efficacy with older adults (Wesch, et al. 2006). Overall, future empirical efforts using mental imagery with older adults who are open to this cognitive technique are justified.

While important information about the acceptability and use of physical activity-focused mental imagery with older adults was gained in the present study, several shortcomings should be noted. First, the sample was predominantly female with a college education so a full understanding about other groups of individuals was not gained here. Future investigations should explore how men and other demographic groups experience mental imagery. Second, the use of self-report to assess adults' perceptions of mental imagery may have biased some of the participants' responses. It is possible that some of the participants were grateful for the opportunity to participate in this intervention and therefore felt compelled to share only positive experiences. Third, mental imagery was only one part of a larger theory-based intervention delivered by trained peer mentors. It is possible that older adults may view imagery in a different manner if imagery was the only part of the intervention or if other individuals, such as trained psychologists, administered mental imagery. Finally, the nature of the study design precludes the possibility of any causal links between participants' experiences with mental imagery and behavior.

In conclusion, it is recommended that investigators explore research participants' views about mental imagery prior to initiating interventions with older adults. Adults who are skeptical about the use of mental imagery should be provided with examples of athletes, exercisers, or other notable individuals who use of mental imagery in various goal pursuits. Another tailoring possibility would be to discuss how mental imagery is used by some people to fall asleep or elicit relaxation. Facilitating participant input in the design of guided imagery scripts may also be a fruitful strategy for researchers and practitioners. Even with tailoring of interventions, it is still possible that some participants may respond negatively to imagery content. Exploring individual differences in attitudes and acceptance toward the use of mental imagery in physical activity settings is recommended.

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References

- Bandura, A. Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall; 1986.
- Bandura, A. Self-efficacy: The exercise of control. New York: Freeman; 1997.
- Bishop FL, Yardley L, Lewith GT. A systematic review of beliefs involved in the use of complementary and alternative medicine. *Journal of Health Psychology*. 2007; 12(6):851–867.10.1177/1359105307082447 [PubMed: 17956965]
- Buman MP, Giacobbi PR Jr, Dzierzewski JM, Aiken-Morgan A, McCrae CS, Roberts BW, Marsiske M. Peer volunteers improve long-term maintenance of physical activity with older adults: A randomized controlled trial. *Journal of Physical Activity and Health*. 2011; 8(Supplement 2):257–266.

- Casperson CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: Definitions and distinctions. *Public Health Reports*. 1985; 100:126–131. [PubMed: 3920711]
- Castro CM, Pruitt L, Buman MP, King AC. Physical activity program delivery by professionals versus volunteers: The TEAM randomized trial. *Health Psychology*. 2011; 30(3):285–294.10.1037/a0021980 [PubMed: 21553972]
- Deci, EL.; Ryan, RM. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum; 1985.
- Duncan LR, Hall CR, Wilson PM, Rodgers WM. The use of a mental imagery intervention to enhance integrated regulation for exercise among women commencing an exercise program. *Motivation and Emotion*. 2012; 10:452–464.10.1007/211031-011-9271-4
- Furnham A, Vincent C, Wood R. The health beliefs and behaviors of three groups of complementary medicine and a general practice group of patients. *Journal of Alternative and Complementary Medicine*. 1995; 1:347–359.10.1089/acm.1995.1.347
- Gammage KL, Hall CR, Rodgers WM. More about exercise imagery. *The Sport Psychologist*. 2000; 14:348–359.
- Giacobbi PR Jr. Age and activity related differences in the use of exercise imagery. *Journal of Applied Sport Psychology*. 2007; 19(4):487–493.
- Giacobbi PR Jr, Hausenblas HA, Fallon EA, Hall CR. Even more about exercise imagery: A grounded theory of exercise imagery. *Journal of Applied Sport Psychology*. 2003; 15:160–175.
- Giacobbi PR Jr, Tuccitto D, Buman M, Munroe-Chandler KM. A measurement and conceptual investigation of exercise imagery establishing construct validity. *Research Quarterly for Exercise and Sport*. 2010; 18:485–493. [PubMed: 21268473]
- Hausenblas HA, Hall CR, Rodgers WM, Munroe-Chandler KJ. Exercise imagery: Its nature and measurement. *Journal of Applied Sport Psychology*. 1999; 11:171–180.
- Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qualitative Health Research*. 2005; 15:1277–1288. [PubMed: 16204405]
- Kim BH, Giacobbi PR Jr. The use of exercise related mental imagery by middle-aged adults. *Journal of imagery research in sport and physical activity*. 2009; 3(1) (Online). 10.2202/1932-0191.1031
- Markus H, Nurius P. Possible selves. *American Psychologist*. 1986; 41(9):954–969.
- Miles, MB.; Huberman, AM. *Qualitative data analysis*. Thousand Oaks, CA: Sage; 1994.
- Munroe-Chandler K, Gammage KL. A New Vision of Exercise Imagery. *Exercise and Sport Science Reviews*. 2005; 33:201–205.
- Nichol J, Thompson EA, Shaw A. Beliefs, decision-making, and dialog about complementary and alternative medicine (CAM) within families using CAM: A qualitative study. *Journal of Alternative and Complementary Medicine*. 2011; 17(2):117–125.10.1089/acm.2010.0171
- Paivio A. Cognitive and motivational functions of imagery in human performance. *Canadian Journal of Applied Sport Science*. 1985; 10:S22–S28.
- Ross-Stewart L, Short SE, Terrance CA. A narrative review of the relationships among imagery, exercise, and self-efficacy. *Journal of Imagery Research in Sport and Physical Activity*. 2010; 5(1) (Online). 10.2202/1932-0191
- Thomas KJ, Nicholl JP, Coleman P. Use and expenditure on complementary medicine in England: A population based survey. *Complementary Therapeutic Medicine*. 2001; 9:2–11.
- Wesch NN, Milne MI, Burke SM, Hall CR. Self-efficacy and imagery use in older adult exercisers. *European Journal of Sport Sciences*. 2006; 6(4):197–203.