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Is Creativity Related to Physical Health? The Relationships Between Creativity, Flow, Self-Esteem, Physical Activity and Health-Related Quality of Life

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Abstract

The relationship between creativity and overall health has not been widely examined, as researchers have previously focused mainly on the association between creativity and mental illness. Certain aspects of the creative personality (i.e. high physical energy, intelligence, passion, and self-discipline) may predict engagement in healthy behaviors. Creativity has been shown to positively relate to self-esteem, which also has been linked to general health. In addition, both athletes and creative individuals tend to experience flow. This study examined self-esteem and flow as possible mechanisms to partially account for the relationship between creativity and general health. Community participants ($N = 83$) completed self-report measures of creativity, flow, self-esteem, health behaviors, and general health and then wore an accelerometer for three consecutive days as an objective measure of physical activity. Path analysis was used to analyze relationships among variables. Results indicated that creativity and self-esteem were significantly positively related, with self-esteem also being related to general health and health practices. While flow and creativity were shown to be significantly and positively related, neither was related to objective physical activity. Self-esteem in creative individuals served as a better predictor of health than the experience of flow. The results supported the hypothesis that creative individuals tend to exhibit high self-esteem, which predicts report of engagement in healthy behaviors and improvements in general health and health related quality of life.

Keywords: creativity, self-esteem, flow, health

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Introduction

In the past, the biomedical model of health and illness was often defined health as "the absence of disease" (Annandale, 1998, p. 262). This led experts to design an entire health care system that was reactive in nature. Health is currently more likely to be defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," (WHO, 1948). Although this definition has not been amended since 1948, it was not until recently that it was actually implemented as the basis for studying health and wellness. Under the WHO definition of health, multiple aspects of an individual's functioning are considered vital to overall health and wellness. Consequently, multidisciplinary approaches to research questions in the health sciences are necessary to address the many different factors that influence overall health. New variables are constantly examined to see how they relate to health. Creativity, for example, has traditionally been related to health in the domain of mental illness (Jamison, 1993). Very little research has been done to investigate the relationship between creativity and physical health.

The Creative Personality

Creativity has been widely studied, yet it is such a complex phenomenon that it is still relatively hard to understand. Creativity is defined as "any act, idea, or product that changes an existing domain, or that transforms an existing domain into a new one" (Csikszentmihalyi, 1996, p. 28). To put it simply, creativity leads to a new product of value (Steinberg, 1997). Previously creativity was shown to be associated with depression and manic-depressive illnesses (Jamison, 1993).

Jamison explains, "The fiery aspects of thought and feeling that initially compel the artistic voyage- fierce energy, high mood, and quick intelligence; a sense of the visionary and the grand; a restless and feverish temperament- commonly carry with them the capacity for vastly darker moods, grimmer energies, and, occasionally, bouts of 'madness,'" (p. 2). This relationship between creativity and mental illness has been widely researched. When envisioning a creative person, some people likely imagine the artist, musician, or writer that Jamison describes: plagued by mental illness and psychopathology. Nevertheless, there is a compelling rationale to suggest that aspects of creativity may be related to good health, both physical and psychological. The present study investigated these aspects of creativity and their interaction with good health. It is hypothesized that the aspects of creativity are more conducive to good health rather than psychopathology, and would therefore be positively related to both mental and physical health.

Multiple approaches have been taken by some of the most prominent minds in psychology in an attempt to explain why someone is considered creative. Whether it is psychoanalytic, humanistic, or a biopsychosocial view, creativity has been examined under every lens. Many of these approaches to the study of creativity have viewed creativity and its identifying traits in a positive light that is compatible with good health, rather than as a means through which to study psychopathology.

In the humanistic approach to creativity, health, growth, and the uniqueness of each individual emerge as prominent themes (Dacey & Lennon,

1998). Rothenberg (1993) stressed, "creativity is both complex and healthy," (p. 147). He identified the creative process as consisting of three separate processes, making it extremely complex. The creative process is dedicated to producing something new, and Rothenberg argued that in order to be successful at this, the creative individual must be free from anxiety and be able to access reality (1993). In other words, he found psychopathology and psychoticism to be obstacles to the creative process. Humanists believe that individuals control of the development of their lives and their work. They are not victims of circumstance under this view. Since creative individuals may take a more active role in the formation of their lives and work, this may mean that individuals who are creative take a more active role in their physical health as well. Establishing a sense of control of one's life is important to the Humanistic view of creativity and may be essential when it comes to developing and maintaining healthy behaviors and habits.

Dacey and Lennon (1998) applied the biopsychosocial point of view to examine the factors that comprise creativity. They describe creativity as a "cognitive, attitudinal, personal, and genetic trait that every person has to some degree," (p. 8). They understand creativity as something that grows and develops over time, and they think every person possesses some degree of creativity. The authors model the creative process using five sources of creative ability: biological features such as intelligence and hormones; personality characteristics such as risk taking; cognitive traits such as lateral thinking; microsocietal circumstances such as relationships with friends and family; and macrosocial conditions such as educational environment (Dacey & Lennon). The present study

explores the personality characteristics associated with creativity, but it is important to note that several factors can contribute to one's overall creativity.

Perhaps the most important name in creativity research is Mihaly Csikszentmihalyi. One of the things Csikszentmihalyi (1996) refers to when assessing creative individuals is their significant ability to adapt to different situations as well as "to make do with whatever is at hand to reach their goals" (p. 51). This may mean that a creative person is more likely to find ways to practice a healthy lifestyle in order to reach some end goal, no matter what challenges arise. Several of Csikszentmihalyi's creative personality traits give rise to the possibility that creative individuals may have more potential to be engaged in physical activity and healthy behaviors. Traits such as high physical energy, intelligence, complexity, passion, playfulness, and self-discipline can all be exhibited in someone who is actively engaged in healthy behaviors and physical activity. Csikszentmihalyi explains, "It seems that the energy of these people is internally generated and is due more to their focused minds than to the superiority of their genes," (p. 58). They also tend to get a healthy amount of sleep, a behavior conducive to good physical health ("Sleep and disease", 2007). This shows that their physical energy is under their own control, which relates back to the Humanist view that creative individuals play an active role in the formation and development of their lives.

Dacey and Lennon (1998) also identify a trait of the creative personality that may make an individual more likely to engage in physical activity and healthy behaviors. Delay of gratification is "the willingness to endure the stress of

prolonged effort so as to reap higher pleasures in the long run," (107). Individuals who have a creative personality are better able to endure whatever activity they are engaged in for longer periods of time in order to receive a greater payoff at the end. Thomas Edison even identified with this trait while working for years on inventing the light bulb. He claimed creativity is "ninety-nine parts perspiration," (Dacey & Lennon, p. 107) after spending years trying to achieve his goal. This trait is also important for those who are involved in a physical activity regimen or diet plan. Delay of gratification directly relates to one's willpower or self-discipline. Though some may have to learn the ability to delay gratification, those who have creative personalities often inherently possess this quality (Dacey & Lennon, 1998). Further, delay of gratification is a trait quite similar to self-discipline, something attributed to creative individuals by Csikszentmihalyi (1996). Thus, both self-discipline and delay of gratification are likely characteristic of individuals who are creative and engage in regular physical activity and suggest a common pathway between creativity and physical health., The present study does not focus on self-discipline as a potential mechanism but conceptually it is a useful construct in considering possible relationships between self-discipline, creativity, physical activity and flow (Csikszentmihalyi, 1996).

Creativity and Health

In a study on creative work and health, Mirowsky and Ross (2007) found that the creativity of one's work or activities "may be as important to health as the autonomy of it, and perhaps even more important," (p. 385). One's autonomy, or the amount of freedom from control one has in the workplace, is related to

creativity in that it can allow individuals to express their creativity without restriction. When tested, the individual effects of creativity had a greater impact on health than autonomy alone. Employees who engaged in creative work, defined as work that is "varied, challenging, nonroutine" and involving originality and self-expression, demonstrated positive associations with general health and physical functioning (Mirowsky & Ross, p. 385). After adjusting for occupational attributes such as degree of hazard, degree of direction and control, complex work with data, people, or things, and whether or not the occupation is considered to be prestigious, the authors found the relationship between creativity and general health to remain statistically significant, with one standard deviation in additional creativity having the same effect on health as a 13.5-year difference in age. Creativity was shown to be associated with health in a way "that equals or exceeds those of education and household income in size, statistical significance, and consistency across models," (Mirowsky & Ross, p. 398). To put it differently, creativity was more positively associated with general health than education and household income were. Those who were in the 60th percentile of creative work as opposed to the 40th percentile had a health advantage equal to being 6.7 years younger. This research suggests that creativity has more of an effect on physical health than may have been previously imagined, and consequently much more research is needed to better understand this relationship and its extent.

Self-Esteem, Flow and Health

Because creativity in relation to physical health has not been widely examined, it is clear that there are potential relationships that remain uninspected.

The identifying traits of someone with a creative personality allow for the possibility that these individuals may be inclined to engage in health behaviors and physical activity due to the nature of their personality. Similarly, there may be a relationship between self-esteem and creativity as well, but the nature of that relationship remains unclear. It is difficult to determine whether individuals are creative because they have high self-esteem or if they have high self-esteem because they are creative. There may also be third variable causes of both creativity and self-esteem that would establish the relationship between the two as relational rather than causal. A recent study showed that self-esteem was positively related to engaging in physical activity and consuming fruits and vegetables and negatively related to eating a poor diet and having a high body mass index (Kristjánsson et al., 2010). This study supports the hypothesis that people who have higher self-esteem are more likely to engage in physical activities and healthy behaviors.

The creative personality trait that most closely resembles an idea of self-esteem is the paradoxical trait of being humble and proud at the same time, (Csikszentmihalyi, 1996). Success can give one a sense of pride, or even self-assurance. It seems that creative individuals seem to harbor a sense of both humility and self-assurance. Success in their creative endeavors can lead to both of these feelings. Though one can have a great sense of self-doubt when taking on a creative project or activity, the sense of fulfillment received from completing that task can balance out the initial insecurity (Csikszentmihalyi).

There are countless mechanisms that may at least partially explain the relationship between creativity and physical health and the present study examines two of these, self-esteem and flow. Self-esteem is "a person's overall sense of self-worth or personal value," (Braden, 1969, p.110). Although it is widely accepted that creativity and self-esteem are related, there is debate regarding whether creativity influences self-esteem or self-esteem influences creativity. I believe that through self-esteem, creativity will positively affect health behaviors and health-related quality of life. People with creative personalities will most likely tend to exhibit higher self-esteem, which will in turn lead them to practice more healthy behaviors in order to take care of their bodies and will then positively reflect on their health-related quality of life. The second mechanism, flow, is explained as a mental state in which an individual has experiences where, "things were going well as an almost automatic, effortless, yet highly focused state of consciousness," (Csikszentmihalyi, 1996, p. 110). Those who are creative tend to experience flow, which produces many of the same feelings as physical activity does. The tendency for a creative person to experience flow will perhaps cause the creative individual to engage in more physical activity and improve their quality of life as a result. Self-esteem and flow are just two of the mechanisms that can be examined as an attempt to explain this complex relationship between creativity and health.

A longitudinal study on adolescents in New Zealand in a complete birth cohort (with follow-ups done at ages 3, 5, 7, 9, 11, 13, 15, 18, 21, and 26) examined low self-esteem as a risk factor for important life outcomes. The

authors found that adolescents with low self-esteem grew up to have more physical and mental health problems than those with high self-esteem, (Trzesniewski et al., 2006) demonstrating a relationship between self-esteem and health and suggesting the importance of personality in individual health practices. If creativity and self-esteem are positively related, then self-esteem could act as a mediator for predicting positive health behaviors and health related quality of life.

Matherly and Goldsmith (1988) tested three self-report measures of creativity and three self-report measures of self-esteem and concluded that the two variables are positively related, with a stronger relationship shown among females. Their findings "support the generally accepted belief that self-confidence and creativity are positively related" (p. 54). The authors used the terms self-confidence and self-esteem interchangeably, and used the Rosenberg Self-Esteem Scale (Rosenberg, 1965) as one of the measures for self-confidence. A limitation of their study was that the sample was restricted to American college students. The present study seeks to generalize these findings with a diverse community sample.

The relationship between self-esteem and healthy behaviors has been studied fairly extensively. Huntsinger and Luecken (2004) found that self-esteem and health behavior were significantly correlated, suggesting that self-esteem "may represent a pathway by which individual styles of interaction with significant others, acquired early in life, can significantly impact key long-term preventative health behaviors," (p. 515). Although the study also assessed individual attachment styles (secure, dismissive, fearful, preoccupied) and found

that those with secure attachments styles scored higher in self-esteem and practiced better health behaviors, they still found self-esteem and health behaviors to be independently related (Huntsinger & Leucken, 2004). Heath behavior was measured through a questionnaire assessing aerobic exercise, smoking, alcohol consumption, nutrition intake, sleep deprivation, and seatbelt use. The positive correlation between self-esteem and health behaviors shows how important self-esteem is in understanding individual health behavior practices. Other studies have shown this relationship as well (e.g., Yarecheski et al., 1997). Another study on self-esteem and health behaviors claimed self-esteem "is considered to be one of the variables with greatest potential for inhibitory or promotional influence on health behavior" (Torres, Fernandez, & Maceira, 1995, p. 404). This means that high self-esteem can have a great impact on practicing healthy behaviors, and low self-esteem a negative impact. In the present study I hypothesized that those with creative personalities would exhibit higher self-esteem, and more positive health behaviors.

Self-esteem is just one mechanism that can explain the relationship between creativity and health. The experience of flow is another mechanism that can also help to explain this relationship. Flow is a highly internalized experience that both creative people and active people experience. Like the relationship between creativity and self-esteem, I believe that creative individuals also have a greater tendency to experience flow. If the experience of flow is positively related to physical activity, then it could act as another possible mechanism for explaining the complex relationship between creativity and health.

Creativity involves producing something new. Csikszentmihalyi (1996) explains, "The process of discovery involved in creating something new appears to be one of the most enjoyable activities a human can be involved in" (p. 113). People who experience flow often describe feeling similar experiences, regardless of whether they are artists, musicians, athletes, or the everyday conventional person. The elements of flow include clear goals, immediate feedback of one's actions, a balance between skill and challenges, a merging of action and awareness, not feeling any distractions, no worry of failure, a loss of self-consciousness, a distorted sense of time, and the activity becoming autotelic, or "something that is an end in itself" (Csikszentmihalyi, 1996, pp. 111-113). The creative process is highly compatible with the achievement of flow. Usually it starts with a goal, whether that is to create something or solve a problem. Being able to determine how well one is achieving the goal can be difficult to measure depending on the activity. In sports, the keeping of score is an easy indicator. Creative achievement is much harder to measure, so individuals may not always have a clear indication of how well they are doing. While flow can occur at a highly competitive level, it is not synonymous with achievement. Flow can occur at various levels of complexity, and is intrinsically rewarding regardless of the level of difficulty or achievement, (Jackson & Eklund, 2004).

Flow is traditionally associated with sport and high performance achievement. The ability to assess flow experience in either physical activity or other specific events is important in understanding how the aspects of flow contribute to physical activity and general health. The challenge-skill balance

dimension of flow is primarily what Cskiszentmihalyi relied on when measuring flow. Jackson and Eklund (2004) explain, "When challenges and skills are both at personally high levels, flow is predicted to occur," (p. 134). They expanded on flow measurement by developing a multidimensional measure that includes all nine flow dimensions and is specifically aimed at measuring flow in physical activity and in specific events (such as writing, painting, or playing music). Cskiszentmihalyi and Seligman (2000) linked the experience of flow with personal growth and named the ability to experience flow as a possible buffer against mental illness. As discussed earlier, growth is a prominent theme in the humanistic approach to creativity. Since creative individuals tend to experience flow, and flow is related to physical activity, this may help to explain why creativity, flow, and health might all be related.

Health Related Quality of Life

It should not come as a surprise that good health behaviors have been demonstrated to be positively related to health related quality of life. Dalton et al. (2000) showed that high physical activity levels (an aspect of modifiable health behaviors) and lower levels of screen time (e.g. time spent in front of a television or computer screen) were associated with a more positive HRQoL. Based on these and previous findings, I expected health behaviors to be related to health related quality of life in the present study.

Physical activity has also been shown as positively related to health related quality of life (HRQoL). A study on domain specific physical activity indicated that leisure time physical activity was positively related to vitality, mental health, and mental component summary scores in females, and bodily

pain, and vitality in males (Jurakić et al., 2010). The Centers for Disease Control and Prevention defines leisure time physical activity as "exercise, sports, and physically active hobbies done in one's leisure time," (CDC, 2009). Jurakić et al define HRQoL as "the personal sense of well-being in physical, mental, and social domains of life" (p. 1303). They note that most studies on the relationship between physical activity and HRQoL only look at the influence of leisure-time physical activity or total physical activity on HRQoL. Job related physical activity, domestic physical activity (e.g. gardening), and transportation physical activity (e.g. walking, biking, or jogging to work) were inversely related to HRQoL in this study (Jurakić et al.). Other studies have found positive relations between transportation physical activity and various aspects of health (Andersen, 2000). The authors suggested this unexpected discrepancy in findings might have resulted from the participants not perceiving transportation physical activity as health enhancing. Socioeconomic status may also play an important role in the results of this study. Lubetkin et al. (2005) found that HRQoL depends on personal income. People who are lower in socioeconomic status may be the ones who are taking public transportation and are working in physically demanding jobs. This would influence the findings of this study, especially the relationships between transportation physical activity and job related physical activity on HRQoL.

This was the first time that transportation and domestic physical activity were assessed individually in a study. The authors noted that age, educational level, cigarette and alcohol consumption, and body mass index may act as

confounding variables in the relationship between physical activity and HRQoL and they therefore attempted to control for them (Jurakić et al., 2010). Since leisure time physical activity was positively associated with HRQoL, this may mean that physical activity that people engage in voluntarily out of enjoyment rather than work or transportation purposes has more of an effect on HRQoL. Looking at total physical activity, however, there is still a positive relationship to HRQoL (Jurakić et al., 2010). Overall, the authors found that "physical activity was significantly related to several HRQoL scales and summary component scores after adjustment for HRQoL correlates" (p. 1308).

Research Questions

I examined the relationship between creativity and health by testing two distinct pathways: one involving the relationship between creativity, self-esteem, and healthy behaviors and the other involving creativity, flow, and physical activity, with both pathways culminating in health related quality of life (HRQoL) as measured by the SF-36 (Ware et. al, 2007). Health behaviors, measured by the Health Practices Index (Berkman, Breslow, & Wingard, 1983), included health promoting behaviors such as amount of sleep per night and physical activity, and health risk behaviors such as alcohol consumption and cigarette use. Physical activity is a type of healthy behavior, but the second pathway looked at it independently and measured it objectively through the use of an accelerometer. As discussed in previous sections, there is a positive relationship between creativity and self-esteem (Goldsmith & Matherly, 1988; Kristjánsson et al, 2010) and between self-esteem and overall health (Huntsinger & Leucken, 2004; Torres,

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Fernandez, Maceira, 1995). Because they value themselves, creative individuals with high self-esteem were predicted to engage in healthy behavior in order to take care of their body and overall health.

The second pathway examined the relationship between creativity, flow, physical activity, and quality of life. Flow is a state of mind in which one feels capable to meet challenges and in turn cannot focus on anything but the goal at hand, therefore losing oneself in this seemingly effortless, time-erasing activity (Csikszentmihalyi, 1996). Creative people tend to have a great deal of physical energy that they are able to control with extreme focus and motivation. Being creative can provide the same sense of fulfillment as physical activity does. Creative people are able to achieve this sense of flow when they are doing what they truly love; one example of this is when athletes are actively engaged in their sport (Csikszentmihalyi). If engagement in physical activity and engagement in creative tasks result in similar feelings, perhaps there are similar psychological processes that occur during both. Flow involves clear goals, a balance between challenges and skill, disappearance of distractions, and a merging of action and awareness (Csikszentmihalyi, 1996). Engagement in physical activity includes these same elements.

The purpose of this study was to explore the relationship between creativity and physical health through two separate mechanisms: self-esteem and flow. I hypothesized a positive correlation between a measure of creative personality and self-esteem and a positive relationship between these variables and greater engagement in healthier behaviors, which in turn will be related to

greater quality of life. I also hypothesized that the combined effects of being creative and experiencing flow plus their independent effects will be related to engaging in more physical activity, which will be related to an improved quality of life.

Methods

Participants

The methods and procedures for this study were approved by the Institutional Review Board (IRB) at Syracuse University. Participants were recruited in one of the following two ways: (a) through the use of flyers posted in public areas throughout the community and campus and (b) through an advertisement in the Syracuse daily email newsletter, SU Today. The flyers and ad stated that the study was on "Life Perspectives and Health Behaviors" and encouraged those interested in participating to call a phone number or send an email to schedule an appointment. Only those who were 18 years or older and who were able to participate in physical activity were accepted for the study. Participants were screened during initial contact, either by phone or email, by answering the questions: "Are you 18 years or older?" and "Are you physically able to participate in regular physical activity?" Participants were informed that they would receive $15 in compensation for their time ($5 to complete the packet and $10 to wear an accelerometer for three days, see below). After three months of recruiting participants, compensation for participation increased from $15 to $35 ($7 to complete the packet, $7 to wear the accelerometer for each of the three days, and $7 to complete the follow up questionnaire) in an effort to increase

participation in the study. An amendment to the IRB was submitted and these changes were approved on February 9, 2011.

Participants consisted of a diverse community sample from Syracuse, New York and its surrounding areas. The participants were 83 community members (54 women, M_{age}= 33.8 years, SD = age range = 15.38, 18-80 years) from different socio-economic, educational, and racial backgrounds. A more detailed description of the sample is provided in Table 1.

To estimate the required sample size needed for the study, I calculated a power analysis based on multiple regression. The largest regression analysis had four predictors (i.e., flow, creativity, flow X creativity correlation, and physical activity) and one dependent variable (quality of life). The estimated relationships between all predictors was small, i.e., $r = 0.2$ (with the exception of the relationship between flow and creativity, which was estimated to be a medium-sized effect, i.e., $r = 0.5$). Using a power analysis to estimate required sample size, I concluded that with alpha = .05 and an estimated effect size of f^2= .08, I needed a sample size of 84 to reach 80% confidence that my statistics would give a probable estimate of the actual population parameters. After conducting a post-hoc statistical power analysis with a sample size of 83, 4 predictors, an observed R^2 of 0.15 and an alpha level of 0.05, I reached 86% power.

Procedure

Eligible participants were scheduled to arrive at the lab on a Wednesday afternoon or evening to complete a questionnaire packet and obtain their accelerometer. Before completing the questionnaire packet, participants agreed to

participate in the study by signing a consent form that was approved by the Syracuse University Institutional Review Board. They were then assigned a study ID number that linked their responses to their identifying information. The questionnaire packet included measures of demographic and background information, health behaviors, self-esteem, creativity, the experience of flow, and health-related quality of life (see below). After completing the questionnaire packet, the participants were asked to take off their shoes and heavy jackets in order to measure their height and weight. That information was entered into the accelerometer software and the participants were given specific instructions (see below) on how to use it for the next three days (Thursday, Friday, and Saturday.) Before participants left they scheduled an appointment for Sunday to return their accelerometers and complete a brief follow-up survey. Participants received a phone call each morning reminding them to wear their accelerometer. The follow-up survey on Sunday asked if they had any difficulties with the accelerometer and if they forgot to wear it at any point. After completion, the participants were given compensation for their time.

Measures

  Background Measure. The background measure included basic demographic information such as gender, age, ethnicity, marital status, employment status, education level, and annual income (see Appendix A). Income was used to determine socioeconomic status. Reported annual household incomes of less than $40,000 were considered to be of low socioeconomic status.

Gough Creative Personality Scale. Creativity was assessed using the modified Gough Creative Personality Scale (Gough, 1979; see Appendix F). The scale is a thirty-item measure that consists of various adjectives (*e.g. capable, conventional, inventive*) and asks participants to indicate which adjectives best described themselves. The scale was modified from the three hundred item Adjective Check List (Gough, 1965), which measured thirty-seven personality traits, to become the Gough Personality Scale which only measures creativity. Eighteen adjectives correspond to higher levels of creativity and twelve adjectives are contraindicative of creative individuals. For each creative item that test-takers mark, they are given one point. For each contraindicative item that is endorsed, one point is subtracted from the total score. A higher total of points indicates higher creativity. Gough (1965) reported an internal consistency coefficient of 0.63 and others reported alpha to be about 0.80 (Cropley, 2000). In the present study, the alpha reliability was .68. Test-retest reliabilities of about 0.70, gathered over a six-month interval for males and a one year interval for females, have been reported (Cropley, 2000).

Rosenberg Self Esteem Scale (RSES). Self-esteem was assessed through a ten-item self-report measure that used a 4-point Likert-type scale (Rosenberg, 1965; see Appendix D). Test-takers read a statement (*e.g. I take a positive attitude toward myself*) and answered strongly agree, agree, disagree, or strongly disagree. Zero to three points were assigned to each specific response, with the total sum of responses ranging from 0-30 (30 being the highest). A higher score indicates higher self-esteem. Robins et al. (2001) have measured the alpha

reliability of the RSES to range from .88 to .90. The authors found strong convergent validity for men and women, different ethnic groups, and for college students and community members (Robins et al.). In the present study, the alpha reliability for the RSES was .91.

Health Practices Index (HPI). Health behaviors were assessed using the Health Practices Index (HPI; Berkman, Breslow, & Wingard, 1983). This measure consisted of 15 items that assessed various health indicators, such as body mass index, alcohol consumption, cigarette smoking habits, sleep habits, and level of physical activity (see Appendix B). A "1" was given for each healthy practice that the participant indicated, and all the responses were summed together for a total score. A higher score indicated a higher number of positive health practices. Steptoe et al. showed a low internal consistency for the HPI. This indicated that the health practices are often independent of each other (Steptoe et al., 1994), an observation that has been demonstrated in other investigations.

Health-Related Quality of Life (SF-36). Health related quality of life was assessed using the SF-36 Health Survey v2 (Ware et al., 2007). The SF-36 was constructed to represent multidimensional health concepts as well as to measure the full range of health states, including well-being and personal evaluations of health (McHorney et al., 1993). Functional health and well-being was measured from the participant's point of view using a 36-item questionnaire (see Appendix C). Questions addressed eight medical outcomes: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health. Evidence for convergent validity indicates that

the total score correlates with other health-related indices such as sleep (+), cognitive functioning (+), health distress (-), family functioning (+), self-esteem (+), recreation (+), communication (+), and symptoms or health problems that are specific to a particular condition (-) (Ware et al., 2007). In the present study, the alpha reliability for the SF-36 was .77.

   Flow Scale (FSS-2). The tendency to experience flow was assessed using a modified flow scale based on the Event Experience Scale (FSS-2; Jackson & Eklund, 2004). In the original scale, test takers were asked to answer questions in relation to an event or activity that they had just completed. In order to be more applicable to the community sample, the scale was modified to encompass experience in general, by instructing the participant to "Please answer the following questions in relation to your experience." There was no past precedent for modifying the scale in this way, but the present study found an alpha reliability of .92, indicating good internal consistency. Per usual instructions, participants were asked to answer questions based on the phrase "*I have a tendency to have experiences where*…" Participants read a statement (*e.g. I am challenged, but I believe my skills will allow me to meet the challenge.*) and were asked to rate their tendency to have experiences where that happens based on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*always*) (see Appendix E). Each statement corresponds to a dimension of flow: challenge-skill balance, merging of action and awareness, clear goals, unambiguous feedback, concentration on the task at hand, sense of control, loss of self-consciousness, transformation of time, and autotelic experience. To obtain the flow dimension

score, the item scores for each dimension were totaled. Evidence of internal consistency indicated that the scales are as strong or stronger than their predecessors (the Flow State Scale and the Dispositional Flow Scale), with a mean alpha of .85 (Jackson & Eklund, 2002).

Physical Activity. Accelerometers were RT3[TM] (Stay Healthy, Inc. 2003) models that assessed physical activity on three planes: up-down, right-left, and forward-backward. The device took a measure every minute for the three days that the participant wore it. The participant's height, weight, age, and sex were programmed in the accelerometer software in order to obtain the most accurate measurements. Participants were given specific instructions to place the device on their right hip when they woke up the following morning (Thursday). They were instructed to remove the accelerometer when they were sleeping, showering, or swimming, and to put it on as soon as they were done doing any of those things. They were asked to wear the accelerometer for the next three days (Thursday, Friday, and Saturday) and to return it at the follow up appointment on Sunday. The average daily physical activity score was determined by summing the total physical activity for the three days (from midnight to 11:59 PM) and then dividing that total by three. Moderate to Vigorous Physical Activity (MVPA) was determined using a cutoff point of >1316.5 counts per minute (Jerome et al. 2009). Minutes of MVPA were summed and then average daily MVPA was obtained by dividing that total by three.

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Results

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Hypothesized Model 1

The first hypothesized model is shown in Figure 1. Rectangles represent measured variables. The arrows connecting variables represent a hypothesized direct effect. A dashed line represents an indirect effect.

The hypothesized model examined the relationship between creativity and health. Figure 1 had one independent variable (creativity) and three dependent variables (self-esteem, healthy behaviors and HRQoL). It was hypothesized that self-esteem would mediate the relationship between creativity and healthy behaviors as well as health related quality of life, which would also be influenced by general health.

For both Models 1 and 2 multicolinearity was addressed by centering the variables. The variables were standardized and were evaluated through SAS. The standardized variables were z-scored in order to compare them on the same metric. The dataset contained responses for 83 participants. Age, sex, race, education, socioeconomic status, and marital status were all possible covariates and were controlled for in the model.

The path analysis was conducted using the M-plus software program to test the relations among the variables in the model and to determine the model goodness of fit. It was assumed that there were linear relationships between variables. The Chi-Square Goodness of Fit test of model fit was not significant (χ^2 (12) = 15.16, p = 0.23), indicating that the model was a good fit. The Chi-Square Goodness of Fit tests how well the model fits to the data. A non-significant Chi-Square value indicates that the model is a good fit for the data. Without controlling for the covariates (age, sex, SES, race, marital status and education),

the model did not fit well. The Akaike Information Criterion (AIC) score was 1648.96. In general, the model with the smallest AIC value among competing models should be chosen (Bollen & Long, 1993). Researchers often choose among several models with closely competing AIC values, however. The AIC value for model 1 and model 2 were very close, (1648.96 and 1641.34, respectively). Since the AIC value fits best with large populations, this may not be the best test of model fit for this study (Bollen & Long). The Comparative Fit Index (CFI) measured 0.94, indicating a good fit. Values should range from 0 to 1.0, with anything under 0.9 indicating an unacceptable fit (Olobatuyi, 2006). The root mean square error of approximation (RSMEA) was estimated to be 0.056. RSMEA compensates for model complexity and should have a value of around 0.06 to indicate a good model fit (Hu & Bentler, 2000).

There was a statistically significant relationship between creativity and self-esteem ($r = 0.32$, $p < .01$) with a 95 percent confidence interval of 0.07 to 0.51. Self-esteem was related to the total HPI score ($r = 0.28$, $p < .05$) as well as highly related to general health ($r = 0.51$, $p < .001$) and mental health ($r = 0.76$, $p < .001$), which were both subscales of the SF-36. Self-esteem was significantly related to overall HRQoL ($r = 0.44$, $p < .001$). Total HPI was also highly statistically significantly related to general health ($r = 0.42$, $p < .001$) and HRQoL ($r = 0.27$, $p < .05$). Results indicated that creativity was not significantly related to healthy behaviors (HPI) but was related to general health indirectly through self-esteem ($r = 0.14$, $p < .05$). Table 3 provides a comprehensive list of correlations between all variables measured in both models. Table 4 gives a list of estimated ß

coefficients between standardized variables in Model 1 results. The table also includes a 95 percent confidence interval for each estimated relationship.

Hypothesized Model 2

The second hypothesized model was shown in Figure 2. Once again, rectangles represented measured variables and the arrows connecting them represented a hypothesized direct effect. Model 2 had two independent variables (creativity and flow) and two dependent variables (physical activity and HRQoL). It was hypothesized that creativity and flow would have combined effects on each other that would predict both physical activity and better HRQoL.

The dataset contains responses for 83 participants. Four participants (4.82%) were missing data on their measured experience of flow, and four participants (4.82%) were missing data on their objective physical activity as measured by the accelerometer. A square-root transformation was performed on the average moderate to vigorous activity variable in order to correct for high kurtosis. Taking the square root of the original mean (46.55, $SD = 39.64$) corrected this problem and resulted in a mean of 6.37 ($SD = 2.49$). All variables were standardized using z-scores in order to compare them on the same metric.

Although creativity was significantly related to flow ($r = 0.25$, $p < .05$), there were no significant relationships between creativity and physical activity or flow and physical activity. When looking at raw vector magnitude output from the accelerometer, which counts all physical activity rather than just moderate to vigorous physical activity, there was a statistically significant relationship between vector magnitude and HRQoL ($r = 0.24$, $p < 0.05$). The effect of MVPA

on HRQoL was not significant. The results did show a statistically significant relationship between flow and HRQoL ($r = 0.30$, $p < 0.05$). Table 4 provides a list of estimated ß coefficients, including a 95 percent confidence interval, between standardized variables in Model 2 results.

The Chi-Square Goodness of Fit Test of model fit was significant (χ^2 (6) = 16.42, $p = 0.01$), indicating that this model was not a good fit. A non-significant Chi-Square value indicates that the model is a good fit for the data, and a significant value indicates that the model was not a good fit to the data. The AIC score was 1641.34. The model with the smallest AIC value should be chosen, but since both models had very close AIC values, this sensitive test is not a good indicator of model fit given the size of the sample and the closeness of values (Bollen & Long, 1993). The RMSEA was estimated at 0.145, with a 90 percent confidence interval of 0.063 to 0.231. A RMSEA score should be close to 0.06 to indicate a good model fit, which this model did not reach indicating it was not a good fit (Hu & Bentler, 2000). Additionally, the CFI score was 0.65; anything under 0.9 is an unacceptable fit (Olobatuyi, 2006).

<div align="center">**Discussion**</div>

The results of the path analysis of model 1 supported the hypothesis that creative individuals will exhibit higher self-esteem, which in turn will predict greater practice of healthier behaviors and better overall general health and HRQoL. The relatively high correlation between self-esteem and general health (a subscale of the SF-36) was unexpected because there is only limited literature that measures this relationship. Similarly, the indirect effect of creativity on general

health was also not expected. Finally, the zero correlation between creativity and healthy behaviors was counter to prediction. When breaking down the different aspects of the Health Practices Index (alcohol consumption, weight, cigarette use and sleep) the only significant correlations were between alcohol consumption and socioeconomic status (which were negatively correlated, $r = -0.24$) and amount of sleep and socioeconomic status ($r = 0.22$). These variables were controlled in the model. Regardless of the lack of relationship between creativity and healthy behaviors, the model was still a good fit to the data. It did not necessarily fit the hypothesis that creativity would be related to healthy behaviors, but self-esteem provided a path through which creativity and general health were indirectly related. Self-esteem acted as a mediator in this model and showed one way that creativity could be related to overall health and quality of life.

The statistically significant positive relationship between creativity and self-esteem adds support to the literature on the topic (Kristjánsson et al, 2010; Trzesniewski et al., 2006; Matherly & Goldsmith, 1988). This relationship is widely accepted but hardly examined. The findings are consistent, however, with the limited literature. Since creativity was measured by a self-report adjective check list (Gough, 1979) and not by achievement or an objective measure, this means that people who are more likely to identify themselves as having personality traits that are indicative of creativity are also more likely to exhibit higher self-esteem, regardless of any level of creative achievement. It is the aspects, not the results, of the creative personality that were correlated with self-esteem and HRQoL in this study. Additionally, healthy behaviors were

statistically significantly related to HRQoL. Practicing healthy behaviors such as getting enough sleep and not smoking should consequently lead to better general health and HRQoL.

The hypothesis tested in model 2 did not explain the complex relationship between creativity, general health, and HRQoL, as the model did not demonstrate a good fit. The only part of the hypothesis that was supported was that there was a relationship between creativity and flow ($r = .25$), which is consistent with the literature on the subject (Csikszentmihalyi, 1996). Neither creativity nor flow correlated with physical activity of any sort, even after age, sex, race, SES, education, and marital status were controlled. This was somewhat unexpected. Since athletes involved in physical activity have consistently described their experience of flow, it was predicted that there would be a positive relationship between the two. More surprisingly, the relationship between physical activity and quality of life was only visible when looking at vector magnitude, which represented the raw counts of physical activity, measured from the accelerometer. This is not what was expected. I predicted that average moderate to vigorous physical activity over the three days would be a better indicator of good health than the raw activity output scores, i.e., tallies of all counts of movement. There was a significant relationship between flow and general health, which was not included in my original hypothesis. I expected flow and health related quality of life to only be related through the mediation of physical activity. This may mean that the mental component of health, which is included within HRQoL, has more

of a relationship with flow than actual physical activity does. This is consistent with the characterization of flow as a mental state.

The purpose of this study was to examine the relationship between creativity and health using two distinct pathways: one involving self-esteem and the other involving the experience of flow. After testing both models, it is clear that self-esteem serves as a better mechanism to help understand this relationship. People with creative personalities also tend to exhibit higher self-esteem. They are then more likely to engage in health promoting behaviors, which have a positive effect on their general health and health related quality of life. The only conclusions that can be drawn from the second model are that flow and creativity are significantly related. Since there were no significant relationships between creativity and physical activity or general health in this model, it is clear that this model is not a practical way to explain how creativity relates to health.

Strengths

There were several aspects of this study that contributed to its overall strength. As reported in the methods section, all of the measures were well validated and have been widely used, with the exception of the Flow State Scale, which was modified specifically for this study.

Also, the use of accelerometers as an objective measure of physical activity was a strength. This allowed the results to not be based solely on self-reported physical activity. Accelerometers are capable of measuring intensity, frequency, and duration of physical activity (Rowlands et al. 2004). Participants used the accelerometer in mode 3, which measured vector magnitude every

minute of the day for three consecutive days. Although the accelerometers have some limitations of their own, their ability to assess physical activity objectively allows for more accurate data.

Another major strength of this study is the diversity of the recruited sample. There were essentially two samples within a single sample, with one consisting mainly of Syracuse University faculty members and students and the other consisting of community members from downtown Syracuse. There was considerable variation across age, race, socioeconomic status, level of education, and marital status. The participants who saw the recruitment flyer in the Syracuse University faculty newsletter or posted around campus were more likely to have higher education and were possibly more affluent. The participants who saw the flyer posted in various community spaces downtown were more likely to be from a lower socio-economic status and possibly had lower levels of education. Participants ranged from being sedentary to highly physically active, and age ranged from 18 years to 80 years. Having a diverse community sample participate in this study rather than only utilizing Syracuse University students helped to make the results more generalizable to the population at large. However, a larger sample that would allow for comparisons between groups representing different levels of SES might further add to this literature as it seems likely that the variables under consideration here (e.g., creativity, flow, self-esteem) may be influenced by SES.

Limitations

There were several limitations to this study. Despite the relative accuracy of triaxial accelerometers, they have been shown to be better suited at capturing walking and jogging activities (Jakicic et al., 1999) since they have a difficult time capturing upper-body movements (Rowlands, 2001). Additionally, they have been shown to overestimate energy expenditure during sedentary activities (Strath et al. 2003) and underestimate high-energy activities (Meijer et. al, 1989). There is also the risk of them moving around while attached to the hip and capturing inadvertent movement that is not associated with physical activity of any sort. In an effort to measure only moderate to vigorous physical activity, I used a cutoff point (>1316.5 counts per minute) to discern between movement of any type and movement that constituted moderate to vigorous physical activity (Jerome et. al, 2009). Even with the cutoff point, there was still the possibility that unintentional movements caused by the accelerometers not being secured tightly to the body could create artifacts in the data, thus affecting subsequent results.

Despite recruiting a very diverse sample for the study, there were a significantly higher number of females (65.06%) and white participants (72.29%). The sample also proved to be very healthy. Although there was a lot of variability between levels of physical activity within the sample, on average people were participating in 45.55 minutes of moderate to vigorous physical activity per day. This was much higher than expected and could have potentially biased the results or reduced the magnitude of correlations found between variables.

Future Directions

  This study showed that there is a significant relationship between creativity and general health (including both physical and mental components). Future research needs to expand the study of creativity to go beyond exclusively studying it in relation to mental illness. The surplus of research on how creativity relates to psychopathology gives the public an image that creativity is unhealthy. This study showed that creativity is related to better general health. This relationship is expressed through the mechanism of self-esteem. Researchers should look at other possible mechanisms that might help to explain this complex relationship and demonstrate that creativity can be related positively to health. Future health and wellness programs that foster creativity in individuals might also be potential paths to explore.

  Socioeconomic status was controlled for in this study, but follow-up studies might be interested in examining how individuals from higher and lower socioeconomic levels might differ among the relationships found between the variables examined in the present study. Individuals who do not own cars may walk more than individuals who do. People from higher socioeconomic levels may be able to afford gym memberships and practice healthier behaviors. Self-esteem may be influenced by socioeconomic status as well. A study examining how different socioeconomic levels alter the relationships among the variables in the hypothesized models might be an interesting area of future research.

  A follow-up study on the relationship between flow and HRQoL might be of interest as well. The relationship between the two variables was not originally

hypothesized, and there is not much literature to support it. Since flow was not

related to physical activity, this may mean that it is related through HRQoL

through better mental health and/or better emotional functioning.

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Table 1

Sample Demographics   *(N = 83)*

Characteristic	*M (SD)*	*N (%)*
Sex		
Male	- -	29 (34.94)
Female	- -	54 (65.06)
Education		
Some college or lower	- -	43 (51.81)
BA or higher	- -	40 (48.19)
SES		
<$40,000 per household	- -	35 (42.68)
>$40,000 per household	- -	47 (57.32)
Race		
Non-White	- -	23 (27.71)
White	- -	60 (72.29)
Marital Status		
Not currently married	- -	59 (71.08)
Currently married	- -	24 (28.92)
Cigarette Use		
Current or past smokers	- -	26 (31.33)
Never smoked	- -	57 (68.67)
Alcohol Consumption		
Heavy Drinkers	- -	6 (7.23)
Light-Moderate/ Abstain	- -	77 (92.77)
Weight		
Under or Overweight	- -	22 (26.51)
Normal range	- -	61 (73.49)
Sleep Habits		
6 hrs or less/ 9hrs or more	- -	19 (22.89)
7-8 hrs	- -	64 (77.11)
Age	33.75 (15.38)	- -
BMI	25.99 (6.32)	- -

Table 2

Continuous Variables

Variable	M	SD
Creativity	5.24	3.84
Self-esteem	23.80	5.40
Flow Total	138.58	18.13
General Health	74.72	18.92
Moderate to Vigorous Physical Activity	46.24	39.48
Vector Magnitude Average	255780	172984
Physical Composite Score	54.90	6.26
Mental Composite Score	47.46	11.18

Note. Physical Composite Score and Mental Composite Score were both measured by the Health Practices Index and when looked at together, constituted General Health. Vector Magnitude Average was the raw data output by the accelerometer averaged over three days. Moderate to Vigorous Physical Activity was determined using a cutoff point of >1316.5 counts per minute.

Table 3- *Variable Correlations*

	VM	MVPA	Age	GH	PCS	MCS	Create	Self-esteem	HPI	Flow	White	Married	Edu	SES	Sex
MVPA	0.93***	1.00	-0.17	0.17	0.11	0.10	0.01	0.08	-0.09	-0.02	0.11	-0.15	-0.17	-0.20	-0.29**
Age	-0.89	-0.17	1.00	-0.07	-0.18	0.05	-0.01	-0.02	-0.18	0.02	0.09	0.63***	0.22*	0.20	-0.17
GH	0.23*	0.17	-0.07	1.00	0.60***	0.45***	0.06	0.51***	0.43***	0.30**	0.32**	0.11	0.01	0.16	0.17
PCS	0.16	0.11	-0.18	0.60***	1.00	-0.06	0.02	0.18	0.45***	0.09	0.36***	0.08	0.03	0.17	0.02
MCS	0.11	0.09	0.05	0.45***	-0.06	1.00	0.17	0.76***	0.23*	0.55***	0.08	0.08	-0.13	0.09	0.06
Create	-0.04	0.01	-0.10	0.06	0.02	0.17	1.00	0.32**	0.09	0.25*	-0.06	-0.09	0.10	-0.11	-0.11
Self-Esteem	0.14	0.08	-0.02	0.51***	0.18	0.76***	0.32**	1.00	0.28*	0.66***	0.11	0.34	0.01	0.11	0.14
HPI weight	0.05	0.12	-0.00	0.26*	0.24*	0.22*	0.01	0.09	0.57***	0.05	0.12	0.08	-0.08	0.14	-0.15
Alcohol Use	-0.38***	-0.34**	-0.05	0.05	-0.01	-0.14	0.13	0.02	0.15	-0.11	-0.17	-0.13	-0.01	-0.24*	0.19
Sleep	0.02	-0.06	0.06	0.15	0.33**	0.09	-0.10	0.12	0.54	0.21	0.11	0.09	-0.05	0.23*	-0.16
Cigarette Use	-0.02	-0.07	-0.40***	0.21	0.17	0.08	-0.10	0.12	0.40***	0.21	0.11	0.09	-0.05	-0.09	0.16
White	0.16	0.11	0.09	0.32**	0.36***	0.08	-0.06	0.11	0.14	-0.07	1.00	0.16	0.00	0.32**	0.17
Married	-0.03	-0.15	0.63***	0.11	0.08	0.08	-0.09	0.03	0.07	0.00	0.16	1.00	0.29**	0.40***	-0.15

*p<.05, **p <.01, ***p≤.001 Note. VM = average vector movement over three days, MVPA = moderate to vigorous activity averaged over three days, GH = general health, PCS = physical composite score, MCS = mental composite score, Create = creativity, HPI = the total score on the Health Practices Index, Edu = education, SES = socioeconomic status using income as an indicator, HPI weight is a measure of underweight/overweight and normal weight

Table 4

95 Percent Confidence Intervals of Model 1 Results

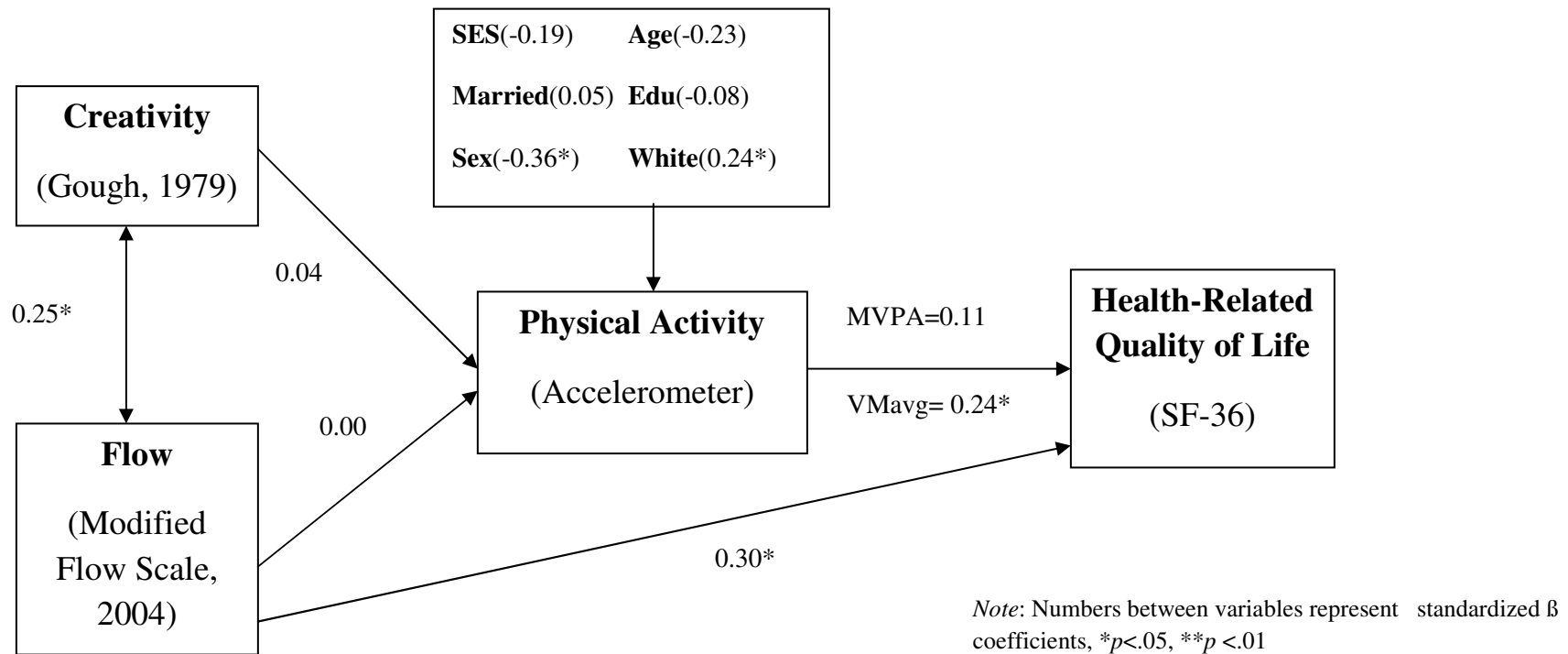|	Lower 2.5 %	Estimate	Upper 2.5%
Creativity on Self-esteem	0.07	0.32**	0.51
Creativity on HPI	-0.31	0.00	0.29
Self-esteem on HPI	0.05	0.34**	0.68
HPI on General Health	0.05	0.22*	0.40
Creativity on General Health (indirect)	0.00	0.14*	0.32
Self-esteem on General Health	0.21	0.43**	0.63
Age on General Health	-0.36	-0.10	0.12
Sex on General Health	-0.30	0.13	0.54
Race on General Health	0.07	0.48*	0.94
Married on General Health	-0.30	0.27	0.91
Education on General Health	-0.39	-0.24	0.37
SES on General Health	-0.48	-0.04	0.3

Note. Estimate represents ß coefficient. Confidence interval is 95%. All relationships represent direct effect, unless otherwise noted.

Table 5

95 Percent Confidence Intervals for Model 2 Results

	Lower 2.5%	Estimate	Upper 2.5%
Creativity on MVPA	-0.29	-0.02	0.21
Flow on MVPA	-0.16	0.05	0.24
Age on MVPA	-0.55	-0.23	0.10
Sex on MVPA	-1.38	-0.74*	-0.14
SES on MVPA	-0.84	-0.39	0.07
Race on MVPA	0.06	0.54*	1.07
Married on MVPA	-0.71	-0.12	0.54
Education on MVPA	-0.58	-0.16	0.31
MVPA on GH	-0.12	0.11	0.29
Creativity on GH	-0.26	-0.03	0.18
Flow on GH	0.04	0.30*	0.56
Flow with Creativity	0.03	0.25*	0.47

Note. Estimate represents ß coefficient. Confidence interval is 95%. All relationships represent direct effect, unless otherwise noted. *$p<.05$, **$p <.01$, ***$p \leq .001$

Figure 1- *Model of the Association of Creativity with HRQoL through Self-Esteem and Healthy Behaviors*
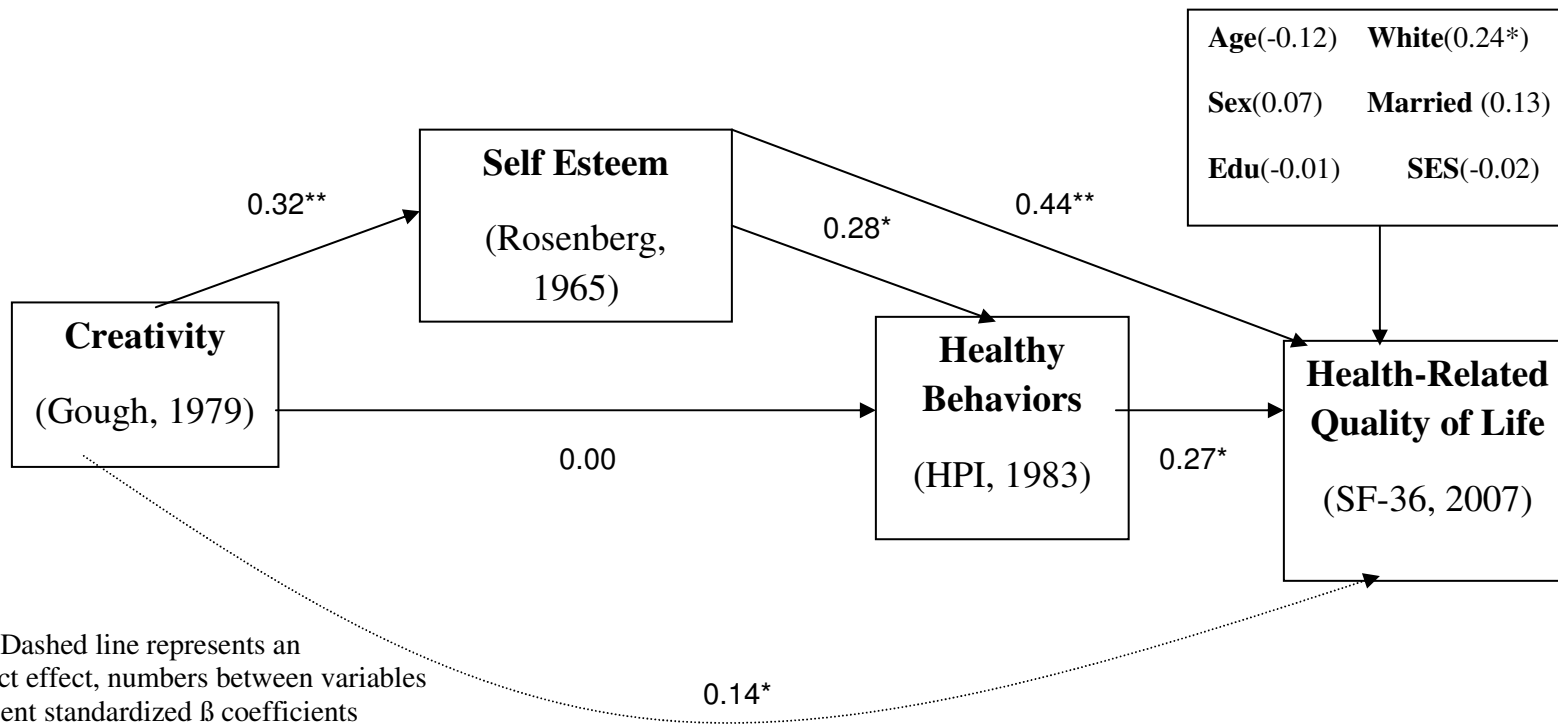
Note: Dashed line represents an indirect effect, numbers between variables represent standardized ß coefficients
*p<.05, **p <.01

Figure 2- *The Combined Relationship of Creativity and Flow with Physical Activity and HRQoL*

SES(-0.19)   Age(-0.23)

Married(0.05) Edu(-0.08)

Sex(-0.36*)   White(0.24*)

Creativity

(Gough, 1979)

0.25*

0.04

Flow

(Modified
Flow Scale,
2004)

0.00

Physical Activity

(Accelerometer)

MVPA=0.11

VMavg= 0.24*

**Health-Related
Quality of Life**

(SF-36)

0.30*

Note: Numbers between variables represent   standardized ß
coefficients, *p*<.05, **p* <.01

Appendix A
Background Survey

1) Sex:

_____ Male
_____ Female

2) Age: _____

3) Choose one racial group that best describes you:

_____ White   _____ Native Hawaiian or other Pacific
Islander
_____ Black or African-American   _____ Mixed Race (more than 1)
_____ Asian   _____ Other (please specify)
                                       _____
_____ American Indian/Alaskan Native

4) Choose one ethnic category that best describes you:

_____ Hispanic or Latino
_____ Not Hispanic or Latino

5) Marital Status:

_____ Single, never married
_____ Currently married
_____ Currently separated
_____ Currently divorced
_____ Widowed

6) Employment status:

_____ Employed full-time   _____ Total disabled temporary
_____ Employed part-time   _____ Total disabled permanent
_____ Retired   _____ Unemployed
_____ Partially disabled temporary _____ Student
_____ Partially disabled permanent _____ Homemaker

7) Highest level of education completed:

_____ Less than high school   _____ 2-year college degree
(Associates)
_____ High school/GED   _____ 4-year college degree (BA, BS)
_____ Some college   _____ Graduate or professional degree

8) What is the approximate annual income for your household?
_____ Less than $20,000
_____ $20,000 - $39,999

_____ $40,000 - $59,999
_____ $60,000 - $79,999
_____ $80,000 - $99,999
_____ More than $100,000

Health Practices Index (1983)

1. What is your current weight?   _____ pounds

2. What is your current height?   _____ feet _____ inches

3. How many hours of sleep do you usually get at night?
   ☐ 6 hours or less
   ☐ 7 hours
   ☐ 8 hours
   ☐ 9 hours

4. How often do you eat breakfast?
   ☐ Almost every day
   ☐ Sometimes
   ☐ Once in a while
   ☐ Rarely or never

5. How often do you eat in-between your regular meals?
   ☐ Almost every day
   ☐ Sometimes
   ☐ Once in a while
   ☐ Rarely or never

6. How often do you participate in the following activities?

		Never	Sometimes	Often
6a.	Swimming or walking	1	2	3
6b.	Physical exercise	1	2	3
6c.	Sports	1	2	3
6d.	Gardening	1	2	3
6e.	Fishing/hunting	1	2	3

7. How often do you drink wine, beer, or liquor?
   ☐ Never
   ☐ Less than one time per week
   ☐ 1-2 times per week
   ☐ more than 2 times per week

8. When you drink wine, beer, or liquor, how many drinks do you usually have in one sitting?
   ☐ 0
   ☐ 1 or 2
   ☐ 3 or 4
   ☐ 5 or more

9. Do you smoke cigarettes?

☐ Yes
☐ No

9a. If yes, on the average, how many cigarettes do you smoke?

☐ less than a pack a week
☐ ½ a pack a day or less
☐ 1 pack a day
☐ 1 ½ packs a day
☐ 2 packs a day
☐ 2 ½ packs a day
☐ 3 or more packs a day

9b. How many years have you smoked this amount? _____years

10. Have you **ever** smoked cigarettes regularly?

☐ Yes
☐ No

10a. If you smoked in the past, on the average, how many cigarettes *did* you smoke?

☐ less than a pack a week
☐ ½ a pack a day or less
☐ 1 pack a day
☐ 1 ½ packs a day
☐ 2 packs a day
☐ 2 ½ packs a day
☐ 3 or more packs a day

10b. How many years did you smoke? _____years

10c. How long has it been since you quit smoking cigarettes? _____ year

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Your Health and Well-Being

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*

For each of the following questions, please mark an ⊠ **in the one box that best describes your answer.**

1. **In general, would you say your health is:**

Excellent	Very Good	Good	Fair	Poor
☐	☐	☐	☐	☐
1	2	3	4	5

2. **Compared to one year ago, how would you rate your health in general now?**

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
☐	☐	☐	☐	☐
1	2	3	4	5

3. The following questions are about activities you might do during a typical day. Does <u>your health now limit you</u> in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
a. <u>Vigorous activities</u>, such as running, lifting heavy objects, participating in strenuous sports	1 ☐	2 ☐	3 ☐
b. <u>Moderate activities</u>, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1 ☐	2 ☐	3 ☐
c. Lifting or carrying groceries	1 ☐	2 ☐	3 ☐
d. Climbing <u>several</u> flights of stairs	1 ☐	2 ☐	3 ☐
e. Climbing <u>one</u> flight of stairs	1 ☐	2 ☐	3 ☐
f. Bending, kneeling, or stooping	1 ☐	2 ☐	3 ☐
g. Walking <u>more than a mile</u>	1 ☐	2 ☐	3 ☐
h. Walking <u>several hundred yards</u>	1 ☐	2 ☐	3 ☐
i. Walking one hundred yards	1 ☐	2 ☐	3 ☐

4. During the <u>past 4 weeks</u>, how much of the time have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a. Cut down the <u>amount of time</u> you spent on work or other activities	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
b. <u>Accomplished less</u> than you would like	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
c. Were limited in the <u>kind</u> of work or other activities	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
d. Had <u>difficulty</u> performing the work or other activities (for example, it took extra effort)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

5. During the <u>past 4 weeks</u>, how much of the time have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a. Cut down on the <u>amount of time</u> you spent on work or other activities	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
b. <u>Accomplished less</u> than you would like	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
c. Did work or other activities <u>less carefully than usual</u>	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

6. **During the <u>past 4 weeks</u>, to what extent has your <u>physical health or emotional problems</u> interfered with your normal social activities with family, friends, neighbors, or groups?**

Not at all	Slightly	Moderately	Quite a bit	Extremely
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

7. **How much <u>bodily pain</u> have you had during the <u>past 4 weeks</u>?**

None	Very Mild	Mild	Moderate	Severe	Very severe
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

8. **During the <u>past 4 weeks</u>, how much did <u>pain</u> interfere with your normal work (including both work outside the home and housework)?**

Not at all	A little bit	Moderately	Quite a bit	Extremely
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

9. These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the **past 4 weeks**...

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a. Did you feel full of life?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
b. Have you been very nervous?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
c. Have you felt so down in the dumps that nothing could cheer you up?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
d. Have you felt calm and peaceful?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
e. Did you have a lot of energy	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
f. Have you felt downhearted and depressed?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
g. Did you feel worn out?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
h. Have you been happy?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
i. Did you feel tired?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

10. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

11. How TRUE or FALSE is <u>each</u> of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
a. I seem to get sick a little easier than other people	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
b. I am as healthy as anybody I know	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
c. I expect my health to get worse	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
d. My Health is excellent	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

THANK YOU FOR COMPLETING THESE QUESTIONS!

Below is a list of statements dealing with your general feelings about yourself. If you strongly agree, circle **SA**. If you agree with the statement, circle **A**. If you disagree, circle **D**. If you strongly disagree, circle **SD**.

1. On the whole, I am satisfied with myself.   SA   A   D   SD

2. At times, I think I am no good at all.   SA   A   D   SD

3. I feel that I have a number of good qualities.   SA   A   D   SD

4. I am able to do things as well as most other people.   SA   A   D   SD

5. I feel I do not have much to be proud of.   SA   A   D   SD

6. I certainly feel useless at times.   SA   A   D   SD

7. I feel that I'm a person of worth, at least on an equal plane
    with others.   SA   A   D   SD

8. I wish I could have more respect for myself.   SA   A   D   SD

9. All in all, I am inclined to feel that I am a failure.   SA   A   D   SD

10. I take a positive attitude toward myself.   SA   A   D   SD

Flow State Scale-2 (FSS-2) (2004)

Please answer the following questions in relation to your experience.

I have a tendency to have experiences where…

	Never	Rarely	Sometimes	Frequently	Always
1. I am challenged, but I believe my skills will allow me to meet the challenge.	1	2	3	4	5
2. I make the correct movements without thinking about trying to do so.	1	2	3	4	5
3. I know clearly what I want to do.	1	2	3	4	5
4. It is really clear to me how my performance is going.	1	2	3	4	5
5. My attention is focused entirely on what I am doing.	1	2	3	4	5
6. I have a sense of control over what I am doing.	1	2	3	4	5
7. I am not concerned with what others may be thinking of me.	1	2	3	4	5
8. Time seems to alter (either slows down or speeds up).	1	2	3	4	5
9. I really enjoy the experience.	1	2	3	4	5
10. My abilities match the high challenge of the situation.	1	2	3	4	5
11. Things just seem to happen automatically.	1	2	3	4	5
12. I have a strong sense of what I want to do.	1	2	3	4	5
13. I am aware of how well I am performing.	1	2	3	4	5

14. It is no effort to keep my mind on what is happening.

                1   2   3   4   5

15. I feel like I can control what I am doing.

                1   2   3   4   5

16. I am not concerned with how others may be
evaluating me.   1   2   3   4   5

17. The way time passes seems to be different from normal.

                1   2   3   4   5

18. I love the feeling of the performance and want to
capture it again.   1   2   3   4   5

19. I feel I am competent enough to meet the high demands
of the situation.   1   2   3   4   5

20. I perform automatically, without thinking too much.

                1   2   3   4   5

21. I know what I want to achieve. 1   2   3   4   5

22. I have a good idea while I am performing about how
well I am doing.   1   2   3   4   5

23. I have total concentration.   1   2   3   4   5

24. I have a feeling of total control. 1   2   3   4   5

25. I am not concerned with how I am presenting myself.

                1   2   3   4   5

26. It feels like time goes by quickly.

                1   2   3   4   5

27. The experience leaves me feeling great.

                1   2   3   4   5

28. The challenge and my skills are at an equally high level.

                1   2   3   4   5

29. I do things spontaneously and automatically without
having to think.   1   2   3   4   5

30. My goals are clearly defined. 1   2   3   4   5

	Never	Rarely	Sometimes	Frequently	Always
31. I can tell by the way I am performing how well I am doing.	1	2	3	4	5
32. I am completely focused on the task at hand.	1	2	3	4	5
33. I feel in total control of my body.	1	2	3	4	5
34. I am not worried about what others may be thinking of me.	1	2	3	4	5
35. I lose my normal awareness of time.	1	2	3	4	5
36. The experience is extremely rewarding.	1	2	3	4	5

Appendix F
Creative Personality Scale, Gough (1979)

_____

Please indicate which of the following adjectives best describe yourself. Check all that apply.

_____	Capable	_____	Honest
_____	Artificial	_____	Intelligent
_____	Clever	_____	Well-mannered
_____	Cautious	_____	Wide interests
_____	Confident	_____	Inventive
_____	Egotistical	_____	Original
_____	Commonplace	_____	Narrow interests
_____	Humorous	_____	Reflective
_____	Conservative	_____	Sincere
_____	Individualistic	_____	Resourceful
_____	Conventional	_____	Self-confident
_____	Informal	_____	Sexy
_____	Dissatisfied	_____	Submissive
_____	Insightful	_____	Snobbish
_____	Suspicious	_____	Unconventional

Written Summary of Capstone Project

Health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," (WHO, 1948). While this definition has been the predominant model for the past sixty-three years, it was not until more recently that researchers began to implement this approach in their studies of health and wellness. Under the WHO definition of health, multiple aspects of an individual's functioning are considered vital to overall health and wellness. Consequently, multidisciplinary approaches to research questions in the health sciences are necessary to address the many different factors that influence overall health. New variables are constantly being examined to see how they relate to health. Creativity, for example, has largely been researched in the domain of mental health and has consequently caused many people to exclusively associate creativity with psychopathology, especially manic depression (Jamison, 1993). Creativity in relation to general health (including both physical and psychological components) has not been widely studied.

Creativity is such a complex phenomenon that it is still relatively hard to understand. Creativity is defined as "any act, idea, or product that changes an existing domain, or that transforms an existing domain into a new one" (Csikszentmihalyi, 1996, p. 28). Multiple approaches have been taken by some of the most prominent minds in psychology in an attempt to explain why someone is considered creative. Whether it is psychoanalytic, humanistic, or a biopsychosocial view, creativity has been examined under every lens. Many of these approaches to the study of creativity have viewed creativity and its

identifying traits in a positive light that is compatible with good health, rather than as a means through which to study psychopathology. Perhaps the most important name in creativity research is Mihaly Csikszentmihalyi. Several of the creative personality traits that Csikszentmihalyi identified (1996) give rise to the possibility that creative individuals may have more potential to be engaged in physical activity and healthy behaviors. Traits such as high physical energy, intelligence, complexity, passion, playfulness, and self-discipline can all be exhibited in someone who is actively engaged in healthy behaviors and physical activity. As Csikszentmihalyi explains, "It seems that the energy of these people is internally generated and is due more to their focused minds than to the superiority of their genes," (1996, p. 58).

Because creativity in relation to physical health has not been widely examined, it is clear that there are potential relationships that remain uninspected. The identifying traits of someone with a creative personality allow for the possibility that these individuals may be inclined to engage in health behaviors and physical activity. Similarly, there may be a relationship between self-esteem and creativity as well, but the nature of that relationship remains unclear. There are countless mechanisms that may explain the relationship between creativity and physical health. The present study examines two of these, self-esteem and flow, to determine if either has an influence on this relationship.

I hypothesized that through self-esteem, creativity would positively affect health behaviors and health-related quality of life. People with creative

personalities would tend to exhibit higher self-esteem, which in turn would predict greater practice of healthier behaviors and better overall general health and health related quality of life (HRQoL). The second mechanism, flow, is explained as a mental state in which an individual experiences "an almost automatic, effortless, yet highly focused state of consciousness," (Csikszentmihalyi, 1996, pg. 110). Those who are creative tend to experience flow, which produces many of the same feelings as physical activity does. I hypothesized that the tendency for a creative person to experience flow would have combined effects on each other that would predict both physical activity and better HRQoL

Participants consisted of a diverse community sample from Syracuse, New York and its surrounding areas. The participants were 83 community members (54 women, 29 men, M_{age}= 33.8 years, age range: 18-80 years) from different socio-economic, educational, and racial backgrounds. Only those who were 18 years or older and who were physically able to participate in physical activity were accepted for the study.

Participants deemed eligible for the study were scheduled to come in on a Wednesday afternoon or evening to complete a questionnaire packet and obtain their accelerometer; a small device that measured physical activity. Before completing the questionnaire packet, participants agreed to participate in the study by signing a consent form that was approved by the Syracuse University Institutional Review Board. They were then assigned an ID number that linked their responses to their identifying information. The

questionnaire packet included measures of demographic and background information, health behaviors (Berkman, Breslow & Wingard, 1983), self-esteem (Rosenberg, 1965), creativity (Gough, 1979), the experience of flow (Jackson & Eklund, 2004), and health-related quality of life (Ware et al. 2007). After completing the questionnaire packet, the participants were asked to take off their shoes and heavy jackets in order to measure their height and weight. That information was entered into the accelerometer software and the participants were given specific instructions on how to use it for the next three days (Thursday, Friday, and Saturday.) The accelerometer was a small device worn on the right hip that was used to objectively measure physical activity on three planes (up-down, left-right, forward-back). Before participants left they scheduled an appointment for Sunday to return their accelerometers and complete a brief follow-up survey. Participants received a phone call each morning reminding them to put on their accelerometer. The follow-up survey on Sunday asked if they had any difficulties with the accelerometer and if they forgot to wear it at any point. After completion, the participants were given $35 compensation for their time.

I tested the hypotheses with two different models. When running the analysis of the data, age, sex, race, education, marital status, and socioeconomic status were controlled for, since they could all possibly cause covariance and alter the hypothesized effects of the variables being examined. I ran a path analysis test through the software program M-plus to test the causal relations among the variables in the model and to determine the

goodness of fit of the model. The first model hypothesized that self-esteem would mediate the relationship between creativity and healthy behaviors as well as health related quality of life (which was also influenced by general health). This model was supported by the analyses, and indicated a good fit. There was a statistically significant relationship between creativity and self-esteem. Self-esteem was also related to healthy behaviors and general health. Creativity showed an indirect effect on general health as well.

The second model represented the hypothesis that that creativity and flow would have combined effects on each other as well as on physical activity in order to improve HRQoL (health related quality of life). After running several statistical tests to determine goodness of fit, it was concluded that this model did not fit well. The only relationships that were supported were those between creativity and flow and flow and general health. Neither creativity nor flow showed a significant relationship with physical activity, and the relationship between physical activity and general health was small.

The purpose of this study was to examine the relationship between creativity and health using two distinct pathways: one involving self-esteem and the other involving the experience of flow. After testing both models, it is clear that self-esteem serves as a better mechanism to help understand this relationship. People with creative personalities also tend to exhibit higher self-esteem. They are then more likely to engage in health promoting behaviors, which have a positive effect on their general health and health related quality of life. The only conclusions that can be drawn from the second model are that

flow and creativity are significantly related. Since there were no significant

relationships between creativity and physical activity or general health under

this model, it is clear that the model was not a practical way to explain how

creativity relates to health.

The strengths of this study included the diversity of the sample, the

reliability of the measures used, and the use of the accelerometer as an

objective measure of physical activity. The limitations of this study included

using an overall healthy sample and some known limitations associated with

the use of accelerometers, including their inability to accurately measure

upper-body movement (Rowlands, 2001). This study showed that creativity is

related to better general health. This relationship is expressed through the

mechanism of self-esteem. Researchers should look at other possible

mechanisms that might help to explain this complex relationship and

demonstrate that creativity can be related positively to health. Future health

and wellness programs that foster creativity in individuals might also be

potential paths to explore.