The built-in environment: the role of personality and physical activity.

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The Built-*In* Environment: The Role of Personality and Physical Activity

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ABSTRACT

This review features recent research on personality correlates of physical activity (PA) and the integration of personality with PA-related social cognition. The current definition and status of general personality work is introduced followed by a review and discussion of the evidence for personality and PA relations. The review concludes with recommendations for personality-channelled PA interventions, and experimental and longitudinal designs.

SUMMARY

Extraversion and conscientiousness may be important endogenous influences on physical activity participation. Physical activity interventions may need to consider these factors for success.

Key Words: Extraversion, Neuroticism, Conscientiousness, Physical Activity Attitude, Activity Trait, Intention

INTRODUCTION

A wellspring of short- and long-term benefits from regular physical activity (PA) have been demonstrated yet over half of the population does not engage in enough activity to reap these benefits [3]. To further confound the issue, most people are aware that regular PA is indeed beneficial [3]. Thus, discrepancies between the recommended dose of activity aside, it would appear that the translation of knowledge about the benefits of physical activity from the scientific community to the general public is not the major stumbling block for action. Still, the large proportion of the population who are not regularly active suggests that physical activity promotion interventions and an understanding of the factors that facilitate or impair regular PA are warranted.

Physical activity determinants and promotion research has focused on the role of the environment as of late. The basic directional premise of this argument is that we have built an environment that is conducive to sedentary behaviours and limiting of PA. The evidence for this premise has been supportive, although the effect sizes for environment-PA relations are small. Further, evidence suggests that regular PA is perceived as a socially desirable behaviour. Thus the "nurture" hypothesis that our social and physical environments are at odds with sustaining a physically active lifestyle has some, albeit limited support. An alternative to the environment approach is the assertion that biological differences in predisposition for regular PA facilitates or impairs an active lifestyle. This "nature" hypothesis may be best studied through personality trait psychology. In this review, I evaluate evidence for the hypothesis that personality traits are related to physical activity and provide commentary on the utility of understanding these relationships. The review concludes with recommendations for future research and the ongoing limitations of this area.

PERSONALITY TRAITS AS BIOLOGICAL MARKERS

Personality trait psychology has the oldest and one of the most muddied histories of the discipline. The notion that stable and enduring human traits result from biological means dates back to Hippocrates. In the mid to later 20th century, however, the notion was almost abandoned in favour of complete environmental situationism [7]. Recently, the study of personality has re-emerged based on improved psychometric instrumentation and growing evidence that people have enduring and consistent dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions and that these tendencies may have a biological/genetic basis [8]. Complete reviews on these aspects are available [7, 8], but the current evidence has demonstrated that personality is heritable, structured similarly across cultures, has high temporal (rank order) stability, and does not relate strongly to parental rearing style. Research on the relations between direct brain processes and psychometrically assessed personality traits is in its infancy, but many personality researchers hypothesize that traits are markers for underlying biopsychological constructs.

One of the other advances in personality trait psychology is the move toward a common higher-order trait taxonomy. This avoids conceptual redundancy and allows for a comprehensive, yet broad foundation of basic and fundamental personality traits that are linked to lower-order more specific traits. Personality is conceived as possessing a hierarchical structure, whereby broad traits (e.g., extraversion) are the antecedents of more specific facet traits (e.g., assertiveness, activity, positive affect, sociability). Indeed, specific facet traits collectively define the broader traits. Common taxonomies range from two to seven basic factors but the most popular personality model is a five-factor taxonomy. This model suggests that extraversion (e.g., tendency to be sociable, assertive, energetic, seek excitement, and experience positive

affect), neuroticism (e.g., tendency to be emotionally unstable, anxious, self-conscious, and vulnerable), conscientiousness (e.g., tendency to be ordered, dutiful, self-disciplined, and achievement oriented), openness to experience/intellect (tendency to be perceptive, creative, reflective and appreciate fantasy, and aesthetics), and agreeableness (tendency to be kind, cooperative, altruistic, trustworthy, and generous) are the basic factors of personality structure.

PERSONALITY AND PHYSICAL ACTIVITY

The hypothesis that personality influences health is as old as personality psychology itself. Smith and Williams [15] summarize that personality may influence health through three potential mechanisms: 1) personality may affect physiological reactions associated with health, 2) personality may affect adjustments to health conditions, and 3) personality may affect health behaviour practices. This latter relationship would denote the basis for personality and PA relations.

In the last 20 years, many studies have integrated some characteristic of personality with PA with mixed results. The major limitation with this literature paralleled general personality psychology research. That is, most of this research has not included a basic comprehensive taxonomy of trait structure. Following this logic for using broad personality taxonomies as a starting place, however, the most convincing evidence for PA and personality relations has come from research using Eysenck's three-factor taxonomy of extraversion, neuroticism, and psychoticism (which is conceptually an integration of low agreeableness and low conscientiousness) and the five-factor taxonomy. Of the nine studies to apply Eysenck's taxonomy, six reported evidence for an inverse relationship between neuroticism and PA and five demonstrated evidence for a positive relationship between extraversion and PA [4]. My work and the work of other colleagues has followed the five factor taxonomy of personality. Of the

five studies to explore bivariate relations with PA using this taxonomy, three have shown negative associations with neuroticism, and four and five studies have demonstrated positive relations with extraversion and conscientiousness respectively [4]. Relationships with PA ranged from small (r = .10) to medium effect sizes (r = .30), and fluctuations in nonsignificance were generally attributed to restricted range in participant samples.

Taken together, the existing evidence suggests that people higher in extraversion, lower in neuroticism, and higher in conscientiousness are more likely to engage in a physically active lifestyle. The samples in these studies varied from community dwelling middle-aged and older adults to undergraduates, designs ranged from random cross-sectional mail-outs with self-reported PA to prospective clinical trials with objective attendance, and personality instrumentation ranged from adjective (lexicon) markers to personality inventories suggesting relatively robust generalizability of findings.

Though bivariate relations are useful, multivariate analyses are helpful to minimize redundancies in our understanding of personality traits and physical activity. Broad taxonomies are often theorized as orthogonal, but inter-correlations among personality constructs are common in the empirical literature. Results of regression analyses of PA on personality traits have generally shown that extraversion is the trait with the most robust independent association with PA[5, 9, 12]. In addition, broad taxonomies of personality are useful starting points, but they do not provide researchers with very much information about the finer facet traits that may associate with PA. Specific facet traits also represent a more complex ancestry than broad traits because they are often reflected by more than one broad trait. It may be these facet traits that provide a more meaningful relationship with a behavioural criterion like PA. Research has demonstrated that the activity facet trait mediates the previously established extraversion-PA relationship and

generally shows a medium (r = .30) effect size with PA [9, 11, 12]. The activity trait is theorized as a key facet of extraversion as well as a demonstrated facet of conscientiousness and represents a predisposition towards being busy, energetic, talkative, and a preference for leading a fast paced life. Thus PA is, theoretically, a logical behavioural outlet for many individuals high in the activity trait, and unlikely for those individuals low in this trait.

INTEGRATING PHYSICAL ACTIVITY MOTIVATION AND PERSONALITY

Bivariate relationships between personality traits and PA tell us little about how personality may affect behaviour. Moreover, both personality and social psychology theorists concur in their hypothesis that personality does not have a direct effect on behaviour. For example, McCrae and Costa [7] suggest that specific goals, attitudes, and motives for particular objects, behaviours, and ideals are likely culturally conditioned intrapsychic functions that are influenced by more factors than personality. This is also somewhat congruent with social cognitive models like Bandura's [2] social cognitive theory (SCT), whereby interactions between the external environment, the person, and behaviour are determined reciprocally. Still, some separation between theoretically stable factors like personality (or sex, race, etc.), and modifiable factors like the social/physical environment may hold heuristic utility in models designed to understand human behaviour. Figure 1 highlights that these two types of factors may be the key antecedents of physical activity motivation. Borrowing from SCT, it is proposed in Figure 1 that social cognitive antecedents are largely the product of prior experiences, observed experiences, or unobserved second/third-hand information. The box suggests that the product of these factors is generally measured as social cognitive constructs like attitudes/social norms or outcome expectancies, and control beliefs/efficacy which ultimately affect summary motivation/intention or goals. Based on current research, the path from personality (and the environment) to PA

generally follows a linear pattern through social cognition and summary motivation. Additional routes however, where personality interacts with 1) the social cognitive antecedents of PA motivation, and 2) motivation-PA relations are also included. Finally, Figure 1 suggests that, pragmatically, it may be necessary to consider direct personality-PA relations independent of summary PA motivation or goals.

Effects of Personality on Physical Activity Social Cognition

Researchers have recently improved upon past personality-PA work by incorporating basic trait taxonomies with several social cognitive theories to understand PA. My colleagues and I have used the theory of planned behaviour [1] and the five factor taxonomy to understand PA motivation and personality relationships [5, 9, 12]. The findings demonstrated medium (r = .30) to large (r = .50) correlations between extraversion and PA attitude and perceived behavioural control but not subjective norm. Thus individuals low in extraversion may be less likely to engage in PA because they evaluate it unfavourably and perceive a lower degree of control over it than their extraverted peers.

We have also included the activity facet trait with the theory of planned behaviour and PA in four samples [9, 11, 12]. Results generally replicate the findings for extraversion, but with slightly larger effects. The most interesting additional information provided by these analyses, however, is the consistently large relationship between affective attitude and the activity facet trait. Affective attitude, self-efficacy notwithstanding, tends to be the most important independent correlate of physical activity motivation [9, 11]. Thus correlates of affective attitude are important information for researchers and health promoters. Further, PA researchers have not focused enough on the antecedents of affect – indeed most of our promotion efforts used to change attitudes lean to the cognitive/instrumental component such as listing the multiple health

benefits and outcomes of regular PA. The finding is convergent with the theorizing of McCrae and Costa [7], who suggest that social cognition theories fail to identify the underlying states that in-part create motives. Our results provide some preliminary evidence that affective attitude toward PA may be, in part, a function of personality.

Personality Interactions with Physical Activity Social Cognition

Indirect relationships between personality and PA via social cognition may be the easiest to understand, but interactions between personality and social cognition that affect PA behaviour may illuminate differences in motivational antecedents across the population. Consistent findings in this regard would point toward the utility of personality-tailored PA interventions. Several studies have evaluated personality moderators of PA cognition-behaviour relations with mixed findings. Many of these studies are again limited by the failure to include a comprehensive personality taxonomy. My research program, using the five-factor taxonomy, has demonstrated that conscientiousness and extraversion moderate the intention-PA relationship [10, 14]. That is, those who are less conscientious and less extraverted are less likely to follow through with their PA intentions compared with their peers who score high on these traits. Theoretically, this seems logical. Those who are not disposed to orderliness and self-discipline seem likely to struggle with keeping to PA plans. Similarly, mimicking the bivariate findings between PA and extraversion, those who have a tendency to be less outgoing, assertive, active, and adventurous may engage in PA less despite initial intentions. The intention-behaviour gap is an often cited but a seldom researched area in health research and the notion that biologically based tendencies predict successful intention translation is interesting. This suggests that many people struggle with fulfilling their intentions in part due to their personalities.

Another avenue of personality-social cognition interactions is the relationship between social cognitive constructs and intention/summary motivation. Our research, for example, has shown that the subjective norm-intention relationship is moderated by neuroticism [10]. Specifically, individuals higher in neuroticism show marked subjective norm-intention correlations (β = .35) in comparison to their less neurotic counterparts (β = .01). In theory, the tendencies towards insecurity and enviousness found in high neuroticism would suggest that these people may look to others for motivational cues to behaviour. The often null or small effect sizes found in subjective norm-intention relations may be an artefact of discrepancies in neuroticism.

Recently, we have extended the findings of five-factor taxonomy by using its facet trait structures [13]. Complimenting prior results, this study showed that industriousness-ambition, a facet trait of conscientiousness, moderated the intention-PA relationship. Insecurity, a facet trait of neuroticism, also moderated the subjective norm-intention relationship. The results demonstrate the utility of starting with a broad taxonomy of traits and moving to more specificity for replication and extension of these initial findings.

Effects of Personality on Physical Activity Independent of Social Cognition?

Although both personality and social cognitive theorists do not hypothesize that personality affects behaviour directly, our research has repeatedly demonstrated an independent medium sized (e.g., β = .23 - .36) effect of extraversion on PA independent of PA social cognition [5, 9, 11, 12]. Similar to the bivariate relationships, extraversion's activity facet trait appears to be the key personality factor of interest. We have speculated that the stability of personality compared to optimistic but ultimately unrealistic PA cognitions may explain this finding. That is, PA cognitions may become more realistic, and thus predictive, as actual PA engagement looms,

but the activity trait may be a more stable distal predictor of PA. Pragmatically, our results still point to the importance of considering personality when predicting physical activity. As PA promoters are often faced with long-term outcomes, it seems prudent to a priori understand the most prominent predictors of PA.

FUTURE RESEARCH IN PERSONALITY AND PHYSICAL ACTIVITY

Using Personality in Physical Activity Intervention Efforts

It has been my experience that integrating personality in PA research has often fallen on deaf ears because personality is considered unchangeable and thus not amenable to interventions. The focus of interventions in PA research has generally centred on changing the antecedents of motivation such as attitudes and self-efficacy. The focus in PA research has shifted recently to changes in the environment to affect PA. Interestingly, this shift, though it runs contrary to personality-behaviour relations, may represent the best form of personality channelled intervention [8]. Specifically, changing PA environments to better match salient personality characteristics may be the best way to implement current personality research with PA promotion efforts. Courneya and Hellsten [6] have demonstrated that PA preferences differ by personality. For example, extraverts prefer group based and high intensity activities compared to introverts. These differences seem useful in the design of intervention efforts for different personalities. Of course, this type of personality-matched intervention will be most successful for 1) those individuals who have been unaware of various PA alternatives that may better match their personality or 2) those individuals who have been attempting and struggling with activities that are discrepant with their personality. Additional research is warranted to evaluate whether this is indeed the case.

Personality-matched interventions that focus on social cognitive constructs may also hold utility. The evidence for personality-social cognition interactions when predicting PA suggests that less extraverted and conscientious individuals may require adjuvant intervention (e.g., implementation intentions, goal setting, behavioural strategies) even when they hold positive intentions. Similarly, individuals higher on neuroticism may benefit from normative based interventions (e.g., involving friends, family) more than their less neurotic counterparts. Figure 2 is a schematic of the process for clinical-level PA intervention that includes a personality-channelled program. In this sequence, personality research is incorporated with basic assessment of PA barriers and motives and the information is used to develop a tailored program. The addition of personality to PA program development will obviously require future evaluation, but it has the potential to add valuable information about the person that may not be evident in direct PA questions.

Personality and Physical Activity across the Life Course

Consistent and life-long PA habits are generally associated with the greatest health benefits, yet PA rates in the population typically decline as a function of age [3]. Interestingly, personality researchers have found that mean extraversion levels follow a similar trajectory [8]. A future endeavour in PA and personality research will be to evaluate the long-term interaction between these two factors. Currently, limited longitudinal research on personality and PA has been conducted, and the available studies were unable to take advantage of the current psychometric advances and conceptualization of personality trait psychology. This future research direction is important for two reasons. First, longitudinal research allows for greater cause-effect interpretation, because symmetry and asymmetry of change between personality and

PA is more likely. The relationship between child temperament and adoption of PA in adolescence/young adulthood, for example, is unknown at present.

Second, personality-PA relations may have a more convincing long-term relationship than demonstrated in the short-term prospective studies in the current literature. Because personality traits are enduring, their effect on life-long PA habits may be more telling than short term PA fluctuations. I have remarked in previous papers (e.g., [11, 14]) that it seems impressive that very general measures of sociability, energy, assertiveness, etc. can out-predict direct assessments PA intention, confidence to overcome barriers, and PA benefits over short (two-week) PA prediction periods. Long-term PA habits, in theory, may have an even larger relationship with personality.

Limitations in Personality and Physical Activity Research

As stated in the introduction, the relatively low PA rates of the population have generally sparked the need to understand the determinants of PA in order to facilitate sound PA interventions. Underlying this rationale is a basic advocacy for PA promotion. Although personality-channelled intervention efforts may be warranted and hold utility, research on personality and PA may be fundamentally basic rather than applied. That is, personality research may help explain why some people do not enjoy PA (low extraversion) or struggle to fit it in their daily routine (low conscientiousness) more than others, but it may not allow for us to do much about it. This information is still useful in PA research to ballast the viewpoint of the "nurture" hypothesis imbedded in the current environment focus. Moreover, our personalities have undoubtedly helped shape the differential environments we currently live in. The inability to change personality, however, obviously limits future promotion efforts.

A second limitation of PA and personality research is centred on the measurement of personality and PA. Many personality researchers have been adamant in their theorizing that personality is explanative of behaviour and not descriptive [7, 8]. The accumulating evidence for the heritability and stability of personality provides evidence for this claim. Still, it is possible that personality trait measures can describe behaviours, which leads to a tautological confound when these traits are then used to predict the same (or similar) behaviours. Past behaviour is generally an excellent predictor of future behaviour but the result may not be due to endogenous traits. My colleagues and I were concerned with this possibility with extraversions' activity facet trait. Fortunately, the results did not change when behavioural items were removed [11]. PA researchers will want to check the content of personality measures in the future to make every attempt to avoid this kind of contamination. Continued use of broad traits (e.g., extraversion) before specific facet traits (e.g., activity) should also help alleviate content contamination problems.

Finally, most of this initial research on PA and personality is correlational in nature. Although correlational evidence is fundamental to cause-effect relationships, it is the weakest form of evidence. Future research is needed that implements experimental (e.g., personality matched interventions) and longitudinal designs.

CONCLUSIONS

Personality trait psychology has seen a re-emergence in recent years and researchers are beginning to apply personality models to understand health behaviour habits. Recent research has demonstrated that extraversion and conscientiousness are consistent positive correlates of PA and neuroticism is a relatively consistent negative correlate. Further, personality traits interact

with PA motivation-behaviour relations. Future research is warranted to evaluate whether personality-channelled PA interventions hold utility.

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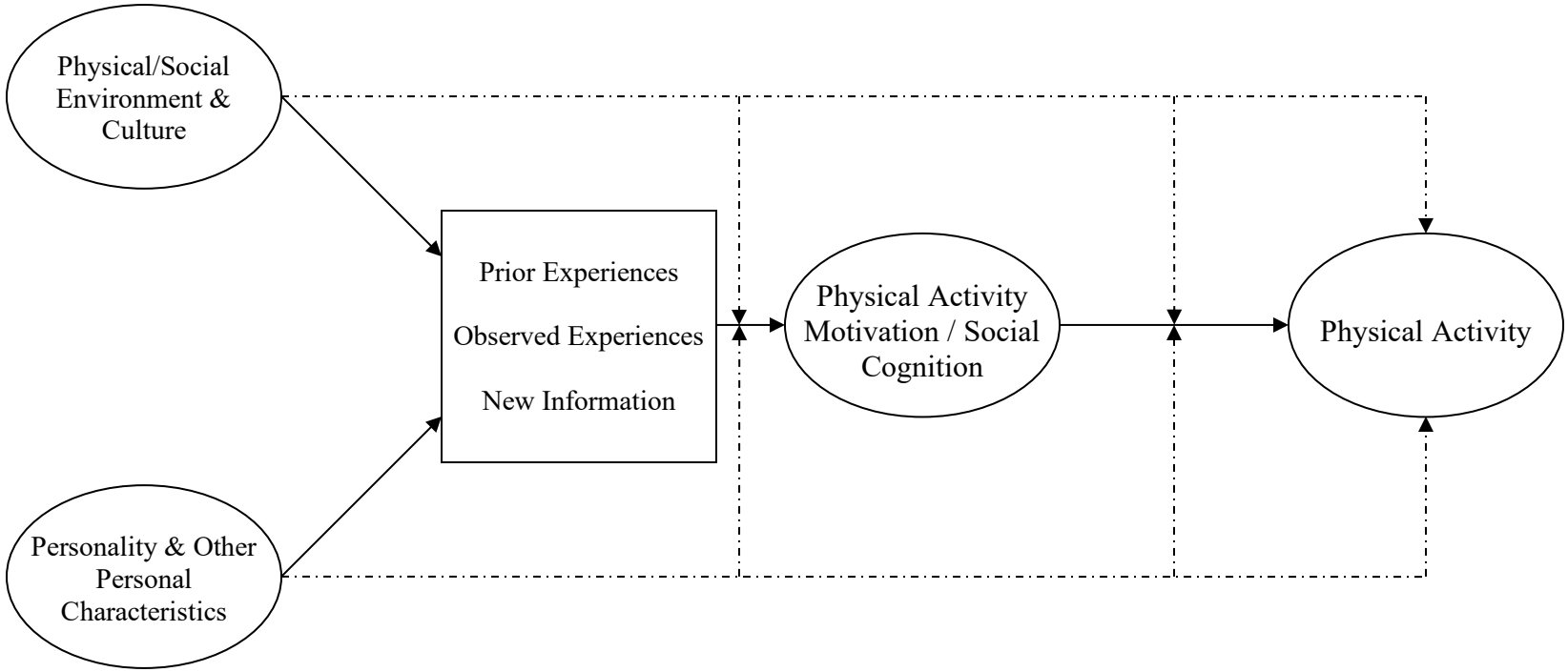
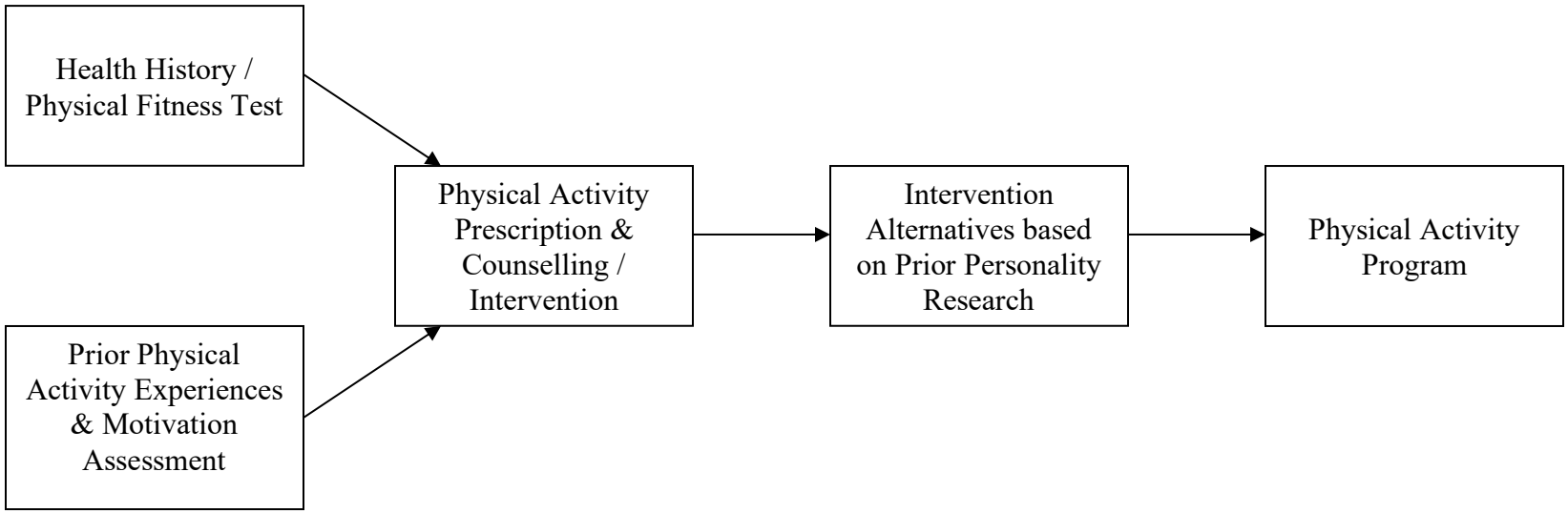
FIGURE CAPTIONS

Figure 1: The Nature and Nurture of Regular Physical Activity: Proposed Routes of Personality and Environmental influences.

Figure 2: Incorporating Personality Tailored Physical Activity Interventions into Exercise Prescription: A Clinical Framework.


Physical/Social Environment & Culture
Personality & Other Personal Characteristics
Prior Experiences
Observed Experiences
New Information
Physical Activity Motivation / Social Cognition
Physical Activity


Health History / Physical Fitness Test
Prior Physical Activity Experiences & Motivation Assessment
Physical Activity Prescription & Counselling / Intervention
Intervention Alternatives based on Prior Personality Research
Physical Activity Program