Environmental and Biopsychosocial Profiling as a Means for Describing Financial Risk-Taking Behavior

John E. Grable, Sonya L. Britt, and Farrell J. Webb

A conceptual model of personal financial risk-taking behavior is described. The approach incorporated environmental and biopsychosocial factors associated with risk-tolerance attitudes and risk-taking financial management behavior. Findings indicated, similar to the method used to describe socioeconomic status, generalized profiling can be a useful tool to help researchers and policy makers improve understanding of the determinants of risk taking. Level of affluence, as described by a person's environmental profile, appeared to serve as a protection against circumstances that could lead to negative financial behavior. Risk tolerance, as a precipitating risk factor, was an important determinant of financial risk-taking behavior.

Key Words: risk profile, risk-taking, risk tolerance, SEM

Introduction

Personal finance researchers and practitioners who are interested in examining and understanding risk-taking behavior face many unanswered questions. Unlike disciplines related to family studies or other academic fields, personal finance researchers have devoted little effort toward integrating environmental and biopsychosocial models of financial management behavior with the study of risk-taking in personal finance (Nairn, 2005). Instead, the study of financial risk-taking attitudes and behavior has tended to focus on the process of security selection as a financial outcome or on testing the role that directly observable personal traits have on the way individuals act when making investment, debt, and consumer purchase decisions. Although the results of these types of studies have been extremely useful in describing risk behavior, existing work has shed little light on the relationships among risk-related behaviors or the means by which personal or environmental factors influence the onset and outcomes of financial behavior. As a result, researchers are fairly confident in their knowledge of the factors associated with risk-taking behavior, but neither researchers nor financial services practitioners can be certain of the causal pathways of financial risk-taking behavior. Without some understanding of the causal factors influencing risk taking it is difficult to understand financial risk taking in a unified manner.

This paper describes a test of a conceptual model of personal financial management behavior that incorporates environmental and biopsychosocial factors as well as financial risk tolerance. The study's main goal was to test the model so that mechanisms which influence a persons' susceptibility to risky financial behavior could be identified. A secondary goal was to provide researchers, financial services practitioners, and policy makers with a tool that could be used to better understand the interrelationships among and frequencies of specific money management financial behaviors. This and other assessments of personal financial behavior may help in the further development of additional tools and techniques for intervening in and improving the lives of consumers.

Previous Research

Jaccard and Blanton (2005) defined behavior as "any denotable overt action that an individual, a group of indi-

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viduals, or some living system (e.g., a business, a town, a nation) performs. An action has a denotable beginning and a denotable ending and is performed in an environmental context in which the individual or group is embedded" (p. 128). As this definition implies, human behavior is varied. Sometimes behavior leads to positive outcomes, while at other times action is negative with respect to outcomes. General research and theory devoted to the relationships between and among the determinants of behavior is quite large. Even within the personal finance field it is possible to find numerous papers that address psychosocial connections with financial behavior (McKenna, Hyllegard, & Linder, 2003; Rha, Montalto, & Hanna, 2006; Stum, 2006), demographic characteristics associated with behavior (Danes & Haberman, 2007), and theoretical discussions of behavioral change (Gutter, Hayhoe, & Wang, 2007; Xiao et al., 2004).

The issue of obtaining a better understanding of financial management behavior, especially among those whom O'Neill, Sorhaindo, Xiao, and Garman (2005) call fiscally 'unhealthy,' is one that is growing in importance. Jessor and Jessor (1977) defined a problem behavior as an action that is "socially defined a problem, a source of concern, or as undesirable by the norms of conventional society" (p. 890). Although this definition was presented in the context of describing adolescent behavior, the definition fits well within the domain of personal finance. Financial management in general, and money management in particular, is within this definitional framework, a behavior that can be defined as either goal-oriented or volitional. If goal oriented, the way in which a person handles his or her financial situation provides a mechanism for achieving a stated goal with the goal influencing action. If volitional, money management becomes tied to a person's behavioral intentions. It is also possible that a person's behavior will be influenced by external factors beyond his or her direct control. For example, an illness, loss of job, or other financial emergency can lead to behaviors that result in negative outcomes. Mismanagement of money, as a problem financial behavior, is of interest in the same respect drug use, smoking, and exercise behavior are of importance, namely, the way in which individuals manage their financial situation has "social, personal, and societal significance" (Jaccard & Blanton, 2005, p. 128).

Behavior can be reasoned, deliberate, conscious or nonconscious, unplanned, and impulsive (Fazio & Towles-Schwen, 1999). It is often useful to view money (mis) management not from the determinants of the behavior

perspective but instead from a consequential point of view–that is, evaluating the consequences of money management behavior. Consider an analogy to teen sexual activity. In some respects, it is more important to understand the consequences associated with unsafe teen sexual behavior–e.g., increased risk of contracting a sexually transmitted disease–than it is to identify the behavior itself, although identifying the causal determinants of teen sex can be an effective means for developing intervening educational programs. The same is true in terms of money management. Mismanagement of one's financial situation is a behavior that increases the likelihood of experiencing financial stress. It is the better understanding of stress consequences that is of ultimate importance in shaping policy and in the development of tools and techniques that practitioners can use to help consumers of financial products and services.

As Jaccard and Blanton (2005) pointed out, it is important to make a distinction between behavior and the outcomes of behavior. As an example, they noted that weight loss is not an overt behavior but rather the result of a previous action, such as modifying diet or exercise regimes. In the same context, risk-taking financial action is not, in and of itself, an overt behavior. Instead, risky financial behavior, as conceptualized in this study, is the outcome of money mismanagement action(s). As Jaccard and Blanton stated: "the theorist will find it helpful to specify those behaviors that impact the outcome and then focus analysis on those behavioral mediators" (p. 141). In this study, the concept being measured was risky financial behavior, which was comprised of the following money mismanagement outcomes: wage garnishments, bankruptcy, overdue notices from creditors, and vehicle repossessions. Notice that each of these outcomes can be viewed as similar to losing weight; that is, a previous action is a direct cause of the outcome. For instance, bankruptcy is an outcome associated with excess indebtedness. It is the result of behaving in such a manner to borrow more than one can reasonably pay back. It should be noted, however, that although indebtedness is often the result of unanticipated events (e.g., medical expenses, housing price declines, loss of job, etc.), this fact does not minimize the effect of money mismanagement behavior on the ultimate outcome.

The family studies literature is replete with evidence that certain types of risky behavior (e.g., deviant action) and outcomes (e.g., crime) can be clustered together (Donovan & Jessor, 1985). Further, clusters of these behaviors and outcomes tend to be influenced by a set of common fac-

tors, such as demographic profile variables, self-esteem, and risk tolerance. Although not explicitly explored within the personal finance literature, it is likely that similar clustering occurs in relation to financial mismanagement behavior and risky financial behavior outcomes. Research in other fields has shown that causal effects of risky behavior tend to remain stable when individuals continue to take action in unchanged environmental contexts (Ajzen, 1991). It is reasonable to assume similar causal stability within the realm of personal finance because generally people are not able to change their environmental situation(s) quickly enough to alter subsequent behavior. Researchers using the Transtheoretical Model of Behavior have shown that those who do change their environmental context occasionally slip back into destructive behavior (Kerkmann, 1998; Xiao et al., 2004). While it is accurate that time, developmental factors, and market trends do vary, the way in which people respond to such changes tends to remain static. Few people relocate after losing their job, for example. Instead, they adapt to the situation by using their skills and currently available resources.

By extension, it is reasonable to hypothesize certain causal relationships from factors, such as environmental variables, psychosocial characteristics, and risk tolerance to risky financial behavior. Further, it is likely that these causal factors remain consistent over time. In order to be considered a causal factor, the variable in question must precede the behavioral outcome. Certainly, generally recognized causes of risky financial behavior (e.g., self-esteem, gender, age) meet this requirement. Consider gender and age. These personal factors are correlated with behavior. Even more important though, is the fact that theorists commonly "treat demographic variables as distal constructs whose effects on behavior are mediated by cognitions, attitudes, personality, and other more immediate behavioral determinants" (Jaccard & Blanton, 2005, p. 162). Implicit in this observation is the notion that these and other factors (e.g., psychosocial constructs) likely have a causal impact on behavior, which may sometimes be mediated or precipitated by other personal characteristics (Finke & Huston, 2003; 2004).

Modeling Risk-Taking Behavior

To date, very little published work in the personal finance field has attempted to model financial risk-taking behavior in a way that is both useful as an intervention tool for financial services practitioners and policy makers who are interested in the outcomes associated with risk taking as well as a tool for further risk research. What has been published, while useful, has tended to focus on either models of risk taking couched in economic utility theory or tests of hypotheses related to the association between and among demographic and socioeconomic factors and risk taking (Grable & Lytton, 1998). In the first case, almost all studies using expected economic utility as a basis for analysis have a normative perspective (Hanna & Chen, 1997). That is, expected utility theory describes how individuals ought to act in a given situation, not necessarily how they actually behave. Further, traditional economic expected utility theory does not fully account for the role that personal and environmental factors play in influencing behavior beyond assuming that a person "should maximize expected utility, with a utility function of wealth" (Hanna & Chen, 1997, p. 18). Although it is generally assumed that the utility function of wealth is influenced by a person's relative risk aversion, the factors that shape an individual's risk-taking preferences are typically not examined as a component of expected utility analyses. This helps explain the need for the alternative approaches used by some researchers when testing relationships among risk taking and demographic and socioeconomic factors.

Researchers using alternative frameworks have generally used observed variables, such as income, age, gender, and marital status when attempting to explain financial risk-taking behavior. Such an approach is a reaction to economic tradition. It is based in part on bounded rationality, which assumes how one assesses risk is shaped primarily by the risk itself rather than by the characteristics of individuals having an influence on the way risk is perceived (Slimak & Dietz, 2006). Sometimes observed factors have been used in economic frameworks, but more typically observed variables have been used as predictors of risk preference within studies employing psychosocial behavioral perspectives. One reason for this approach is that observed variables are both relatively easy to measure and are used often by financial services practitioners to classify individuals into risk-taking categories (Nairn, 2005). Findings showing direct links between age (e.g., being young) and gender (e.g.., being male or female), for instance, and risk taking have added to the personal finance field's understanding of risk taking. A few studies have explored the association between risk taking and psychosocial variables using unobserved variables (e.g., self-esteem). Results from these studies suggest that psychosocial factors (e.g., self-esteem) may play an important role in a person's decision to engage in risk-taking behavior (Krueger & Dickson, 1994). There have even been few studies that have examined both observed and unobserved

variables concurrently in relation to financial risk taking (e.g., Grable & Joo, 2004), but this approach has not been typical, probably because data are difficult to obtain or have not been conceptualized or collected in a manner that would allow for such analytical approaches.

The end result of these investigations is that researchers now have a comparatively keen understanding of the role that certain demographic, socioeconomic, and psychosocial factors perhaps may play in directing a person's risk-taking behavior. Unfortunately, there has been little attention paid to the unifying aspects of these variables on risk taking. Specifically, very little is known about how a person's generalized profile, which is comprised of a number of interrelated environmental and biopsychosocial factors, relates to risk taking. Instead, researchers' knowledge is often limited to comparatively simple associations. For instance, being male is generally associated with increased risk-taking behavior. Some research indicates interactions may exist. For example, unmarried males appeared most likely to take risks (Yao & Hanna, 2005). Although understanding these types of relationships is useful, a more comprehensive perspective is needed to obtain a broader understanding of the factors that lead to taking risks. Researchers have yet to develop individual profiles based on a number of personal factors to determine if such a profile – a picture of a person's larger self– can be used to describe financial risk-taking behavior. Individual profiling, within a risk-taking causal framework, may hold the key to unlocking the triggers to financial risk taking.

A Causal Model of Risk Taking

Although a causal framework for *financial* risk taking does not yet exist, a model developed by family studies researchers offers tantalizing possibilities for adoption into personal finance. Building upon a causal model of adolescent risk-taking behavior created by Irwin and Millstein (1986), Irwin (1993) theorized that there are a number of predisposing and precipitating factors that influence risk-taking behavior. He categorized risk-taking factors in an intervention model that integrates the role that environmental and biopsychosocial factors have on risk taking. Biopsychosocial factors include gender, self-esteem, and age, as well as other personal characteristics that are "primarily endogenous" (Irwin, 1993, p. 21) to the individual. Environmental characteristics are exogenous to a person, meaning that the individual obtains or experiences these factors in their life as compared with biopsychosocial factors, which are purely personal (e.g., traits, genetics, etc.).

Figure 1 illustrates the intervention model in its most basic form. Predisposing factors are thought to increase a person's vulnerability to circumstances which lead to making a risky choice. A precipitating factor is "more immediate and may be the final pathway causing" (Irwin, 1993, p. 21) a person to initiate behavior. This study postulated that this model can be adapted to explain the casual pathways of financial risk taking. Specifically, it was hypothesized that an environmental and biopsychosocial profile can be developed for individuals and used in a financial planning context. These profiles consist of predisposing characteris-

Figure 1. Intervention Model of the Principal Factors in Risk-Taking Behavior
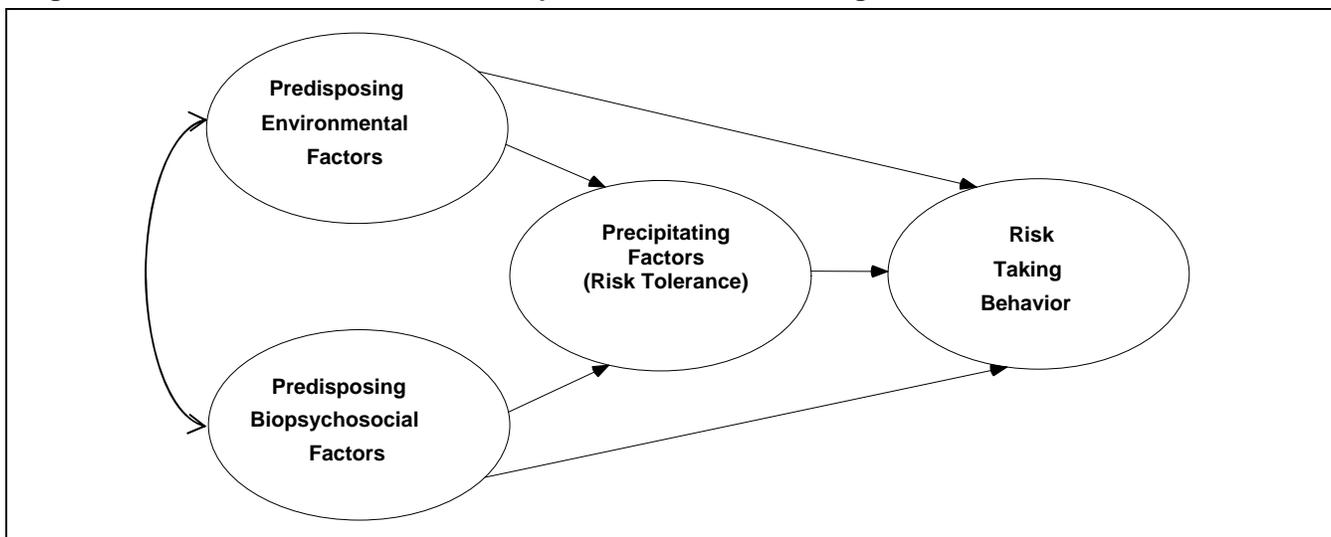
tics that are known to be associated with risk taking. The profiling system is similar to the approach used to measure and model socioeconomic status (Nam & Powers, 1983). Further, environmental and biopsychosocial profiles were hypothesized to have an influence on precipitating factors, such as a person's preference for risk and risk behavior.

Irwin's (1993) definitional framework and conceptual model has been used most often in studies designed to test factors associated with adolescent and youth risk taking (e.g., Gullone, Moore, Moss, & Boyd, 2000; Jelalian et al., 1997; Lee, Su, & Hazard, 1998); however, there have been a few attempts to apply the model to personal finance issues. Grable and Joo (2004) used the Irwin model to determine that education, net worth, financial knowledge, and household income, framed as environmental factors were positively related to financial risk tolerance. They also noted that self-esteem was a significant biopsychosocial factor associated with financial risk tolerance.

Causal models of risk-taking behavior, similar to the one proposed in this study, are not found exclusively within the family studies field. Sitkin and Pablo (1992) proposed a causal model of the determinants of risk behavior within organizational settings. They hypothesized a model that placed risk perception and propensity as mediating variables between risk behavior and causal factors of risk behavior. The importance of the Sitkin and Pablo study was the finding that certain characteristics of decision makers affect risk decisions and that personal characteristics tend to influence behavior indirectly through mediating variables, such as risk tolerance (as defined in this study).

Causal Factors of Risk Tolerance

The relationships between and among the constructs illustrated in Figure 1 are generally supported in the literature. Consider again the Grable and Joo (2004) study. They used Irwin's (1993) risk-taking behavioral model to study the effects of environmental and biopsychosocial factors on financial risk tolerance. Findings from their study indicated that several individual factors are associated with financial risk tolerance, defined as the maximum amount of uncertainty someone is willing to accept when making a financial decision or "the willingness to engage in behavior in which the outcomes remain uncertain with the possibility of an identifiable negative outcome" (Irwin, 1993, p. 11). These factors include household income, net worth, and self-esteem. Those with higher household income and

net worth, and those with high self-esteem, are apt to be more risk tolerant. For example, Ardehali, Paradi, and Asmild (2005) concluded that "average risk tolerance increases as the income level increases" (p. 507). Halek and Eisenhauer (2001) and others (e.g., Hallahan, Faff, & McKenzie, 2004) have also noted relationships among certain environmental and biopsychosocial factors and a person's willingness to engage in a risky behavior. Halek and Eisenhauer and Ardehali et al. found that younger people and men tend to be more risk tolerant, whereas Joo and Grable (2004) noted that financial satisfaction is positively associated with outcomes related with risk-taking behavior. Results from studies of these type support the premise that certain personal characteristics can reasonably be assumed to be associated with a person's willingness to engage in risk-taking behavior.

The Effect of Risk Tolerance on Risk Taking

There is a significant body of evidence to suggest that risk tolerance is positively associated with risk-taking behavior as shown in Figure 1 (Bailey & Kinerson, 2005; Coleman, 2003; Finke & Huston, 2003; Jacobs-Lawson & Hershey, 2005; Tigges, Riegert, Jonitz, Brenglemann, & Engel, 2000). It is generally assumed as true that having a willingness to take risks is a prerequisite for accumulating wealth (Yao, Gutter, and Hanna, 2005), although it is possible for wealth to decrease if a person mismanages their financial situation. Research findings reported by Chang, DeVaney, and Chiremba (2004) pointed to the positive relationship between risk tolerance and risk behavior. They noted that "subjective risk tolerance positively influenced objective risk tolerance" (p. 53). In their study, objective risk tolerance was measured by the amount of risky assets used for investment relative to net worth. While results reported by Chang and her associates are important in terms of providing support for the risk tolerance-behavior association, their findings also pointed to a void in the literature. There is a paucity of research devoted to understanding the causal pathways from personal characteristics through risk tolerance to money management behavior that can best be described as unhealthy (O'Neill et al., 2005). That is, much of the literature showing a causal link between risk tolerance and risk behavior views behavior in terms of positive outcomes. Allocating assets towards equity investments that result in high returns and greater accumulation of wealth is the primary example of this research tendency. This paper extends the causal link to suggest that risk tolerance may also have an impact on non-investment behavior, particularly financial mismanagement action. It is likely, as

shown in Figure 1, that risk tolerance, acting as a precipitating factor, will retain its role in shaping risk-taking money management behavior that leads to negative outcomes.

Factors Effecting Both Risk Tolerance and Risk Behavior
The research consensus suggests that nearly all of the factors associated with financial risk tolerance also tend to be related to financial risk-taking behavior. The influence of gender on financial risk taking is one of the most widely examined relationships in the literature. Ardehali and associates (2005), paraphrasing Slovic (1966), summarized the gender-risk hypothesis this way: "The prevalent belief in our culture is that men should, and do, take greater risks than women" (p. 504). In general, researchers studying gender-risk differences have indeed found that men tend to be more likely than women to engage in risky behavior (Arch, 1993; Olsen & Cox, 2001), with males "more willing to accept financial risk than females" (Zuckerman, 1994, p. 149).

Age is another factor commonly associated with risk taking (Finke & Huston, 2003). In general, it is accepted as true that older individuals take fewer financial risks as compared with younger persons (Deaves, Veit, Bhandari, & Cheney, 2007; Nairn, 2005). Net worth and household income (Deaves et al., 2007; Grable & Joo, 2004) are thought to be positively associated with increased risk tolerance and risk taking. It is reasonable to hypothesize that wealthier individuals have a higher capacity to "absorb the losses resulting from a risky investment" (Ardehali et al., 2005, p. 507). Financial satisfaction is yet another personal characteristic thought to be positively associated with risk taking, with those having high satisfaction being more willing to incur risk. An explanation for this causal effect can be found in the Affect Infusion Model. This model hypothesized that a person's affective state has an effect on risk taking. Specifically, a positive outlook, which can be assessed by measuring satisfaction, tends to increase risk tolerance and the propensity to take risk (Forgas, 1995; Rusting & Larsen, 1995) primarily because those with a high satisfaction level construe subjective probabilities differently than others.

Certain psychosocial factors also have been shown to influence financial risk taking. For example, self-esteem, which is defined as a subjective evaluation based on feedback received from others concerning behavior, appearance, and other personal traits, is generally related to risk taking. Arch (1993) found that those with positive self-esteem tend to be risk takers. Judge, Thoresen, Pucik, and Welbourne (1999) noted a relationship between positive self concept (i.e., a form of self-esteem) and risk taking for those facing industrial organizational change. In an earlier study, Krueger and Dickson (1994) concluded that individuals who perceive themselves as good decision makers (i.e., possessing high self-efficacy) were much more likely to take risks as compared with others, especially those who were filled with self-doubt. Results of these and similar studies point to a common link between psychosocial factors such as self-esteem and risk tolerance and risk-taking.

Personal Social Profiling
Prior literature has established a link between risk-taking behavior and an elevated level of risk tolerance. This work also indicates that several environmental and biopsychosocial characteristics appear to influence a person's risk tolerance and risk-taking behavior. Less is known, however, about the extent to which the combined effects of environmental and biopsychosocial characteristics might influence risk tolerance and risk-taking behaviors.

To address this issue, it is helpful to develop a "social profile" of an individual that is a composite measure of several personal characteristics. This approach has precedence in the literature. The study of socioeconomic status comes to mind as an example of personal social profiling. Researchers have recognized that individuals routinely assess the status level of others. Knowing this, researchers set out in the early 20th Century to develop useful tools for application in assessing the status level of individuals and groups. The use of social status profiles was deemed important to help researchers better understand social stratification as a way to predict behavior (Nam & Powers, 1983). Early attempts at profiling relied on rankings of occupation status. While still used, occupation rankings, as a measure of social status, were found to be overtly subjective and restrictive. Today, it is much more common for researchers to use a combination of personal factors–primarily environmental in nature–to evaluate social status. For example, Rojewski and Yang (1997) conceptualized socioeconomic status as a composite of family income, parents' educational level, and parents' occupations. Mulatu and Schooler (2002) developed status profiles using education, family income, and occupational status, whereas Elovainio, Kivimaki, Kortteinen, and Tuomikoski (2001) measured socioeconomic status with education and family income.

Regardless of the way in which socioeconomic status or other profile constructs are measured, two observations hold true. First, socioeconomic status and personal profiles are not directly observable. These are latent constructs made up of observed personal characteristics, such as education and income. Second, socioeconomic status and personal profiles are measured and used as tools to explain behavior. Few researchers would be comfortable using only one variable as a proxy for socioeconomic status. Social status, for example, as conceptualized today, is a multidimensional construct. It is this composite measure, rather than one variable, such as family income that is important in explaining behavior. In a similar vein, it is reasonable to conclude that a personal environmental profile, rather than one variable, such as net worth, offers a better explanation of financial risk tolerance and risk-taking behavior. Similarly, a composite biopsychosocial profile is likely a better tool for describing risk tolerance and risk behavior than one variable (e.g., gender) comprising the profile.

Evidence exists to support this last point. Researchers have used socioeconomic status to predict all sorts of behavior, often within causal models similar to the one examined in this study. For instance, Elovainio et al. (2001) used socioeconomic status to predict hostility, noting that hostility is linked with health risks. They determined that hostility is associated with low socioeconomic status. In an earlier study, Figueredo and McCloskey (1993) reported that one of the principal causes of domestic violence is low socioeconomic status. Specifically, the primary perpetrators of domestic violence tend to be competitively disadvantaged males. Rojewski and Yang (1997) noted that socioeconomic status has a direct relationship with a person's occupational aspirations. Those with higher levels of socioeconomic status, when measured with a composite profile, are more likely to aspire to stereotypically prestigious occupations. The role of socioeconomic status, as a profile measure, is known to play a reciprocal role in behavioral choice. Mulatu and Schooler (2002) found that socioeconomic status has a positive affect on health, and that health has a positive affect on socioeconomic status. In terms of financial wellness, Cheung (1998) concluded that a person's well-being is also associated with social status. As these studies suggest, latent personal profiles comprised of observed individual characteristics have been used within a diverse set of causal models designed to understand behavior and choices. In the current study, it is hypothesized that environmental and biopsychosocial

profiles can serve the same purpose in identifying causes of risk-taking financial behavior.

Theoretical Framework

The model illustrated in Figure 2 was conceptualized using structural equation modeling methodologies, and it represents the hypothesized financial risk-taking model proposed in this study. The environmental (ENV) and biopsychosocial (BPS) profiles are latent characteristics, meaning that they cannot be directly observed and measured. The profiles are, in effect, variables developed to represent two sides of a person's life, namely, those characteristics that are exogenous and those that are endogenous. The ENV profile consists of three observed (indicator) variables: net worth (NetWrth), Financial Satisfaction (FinSat), and Household Income (HH Inc). The BPS profile is also comprised of three observed variables: Self-Esteem (SE), age, and gender (i.e., being male). Risk tolerance (Risk Tol) is used as a proxy for precipitating factors – a characteristic that increases vulnerability to circumstances which lead to making a risky choice (Irwin, 1993) – in the model. Risk-taking behavior (Risk Beh), rather than being measured with one observed variable, is shown to be a latent construct comprised of four observed (outcome) variables: Wage Garnishments (Garn), Bankruptcy (Bank), Overdue Notices from Creditor (Ovdue), and Vehicle Repossession (Repo). In effect, wage garnishments, bankruptcy, receiving overdue notices, and having a vehicle repossessed are outcomes associated with money mismanagement. Together, these behavioral outcomes suggest that a person has engaged in risk-taking financial behavior. Conceptually, individuals who have experienced these types of harmful risky behavior will also have a risk-taking profile that is different than those who have avoided these behavior outcomes.

Hypotheses

As the review of previous research suggests, there are a number of factors that are acknowledged to be associated with risk-taking behavior. This study hypothesized that an individual's environmental and biopsychosocial profile exerts significant direct influence on a person's willingness to engage in financial risk taking, resulting in both direct and indirect effects on a person's financial risk behavior. A number of specific research hypotheses were proposed:

> Hypothesis 1. A person's environmental and biopsychosocial profiles are statistically significantly correlated.

Figure 2. Model of the Principal Factors Associated with Risk-Taking Behavior
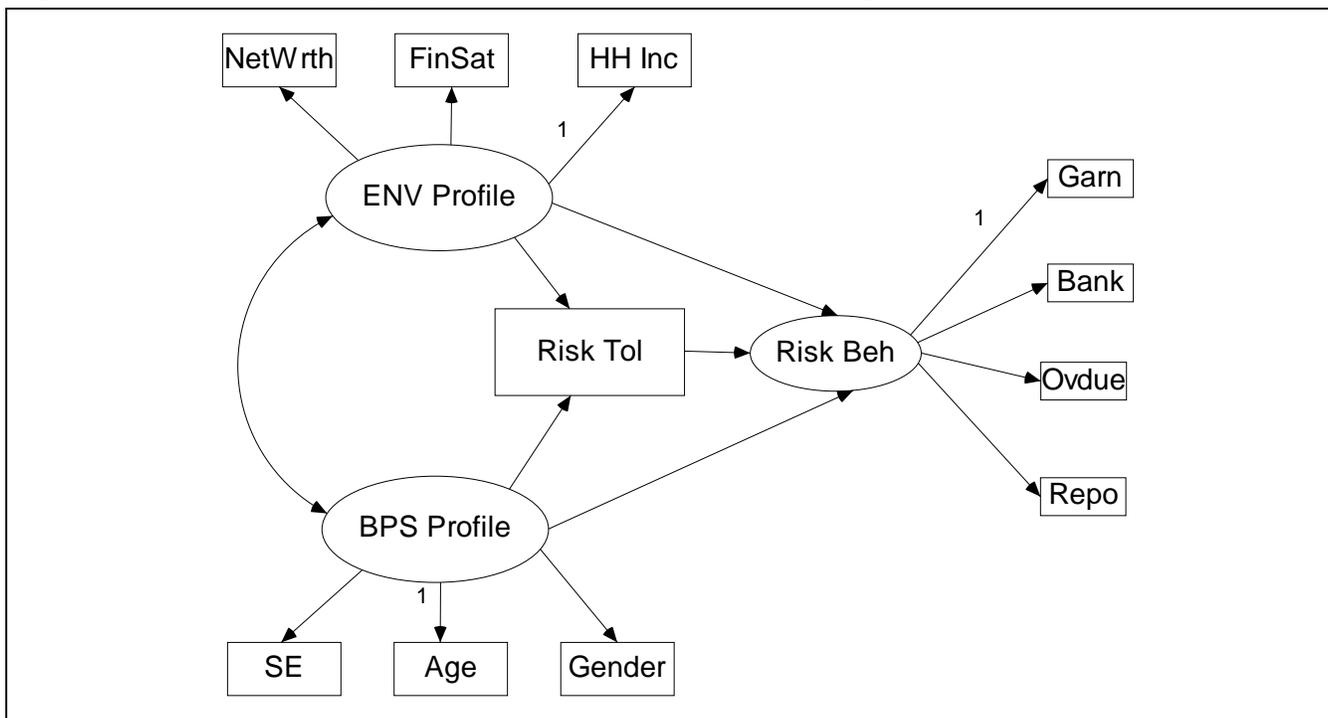
Hypothesis 2. A person's net worth situation, financial satisfaction, and level of household income define an environmental profile.

Hypothesis 3. A person's level of self-esteem, age, and gender define a biopsychosocial profile.

Hypothesis 4. A person's environmental profile has a positive effect on risk tolerance but a negative effect on risk-taking financial behavior that results in a negative outcome.

Hypothesis 5. A person's biopsychosocial profile has a positive effect on risk tolerance but a negative effect on risk-taking financial behavior that results in a negative outcome.

Hypothesis 6. Financial risk tolerance, as a precipitating factor, has a positive effect on risk-taking behavior.

Method
Data for this study were obtained from a survey distributed to a convenience sample of individuals living in three cities in one Midwestern state. The sample frame consisted of staff employees at a university and several private employers. Potential respondents from the university setting were non-faculty staff randomly selected from a campus directory. Others in the sample were selected from mailing lists owned by the researchers. Thirteen hundred surveys were originally mailed during spring 2005 using the U.S. postal service. The survey was 10 pages long, and a pre-paid return envelope was provided. The survey asked questions related to marital and family issues, financial risk tolerance, psychological traits, and demographic and socioeconomic background information. Respondents were given an opportunity to request findings from the study. No follow up mailing or reminders were used. Approximately 550 surveys were returned. Five hundred surveys were useable after accounting for undeliverable, unopened (i.e., a returned survey that was not opened), and non-useable surveys with missing data. This resulted in a useable response rate of approximately 38%.

Sample Characteristics
The sample used in this study was relatively homogenous and representative of the three communities from which data were collected; however, the sample was, on average, better educated and wealthier than the state and nation. Approximately 10% had a high school degree or less in attained education. Twenty-eight percent had some college or vocational training, 6% held an Associate's degree, 34% held a bachelor's degree, and 22% had a graduate or professional degree. Four percent of respondents had house-

hold incomes of $20,000 or less, 12% had incomes between $20,001 and $30,000, 11% had incomes between $30,001 and $40,000, 15% had incomes between $40,001 and $50,000, 14% had incomes between $50,001 and $60,000, 14% had incomes between $60,001 and $70,000, 12% had incomes between $70,001 and $80,000, 7% had incomes between $80,001 and $90,000, 4% had incomes between $90,001 and $100,000, and 7% had incomes greater than $100,000. The median income fell between $50,001 and $60,000. The sample was also overrepresented by women who accounted for 71% of the sample, while the remaining 29% were men. The mean age of respondents was 44.2 years (SD = 12.0). Less than 1% of the sample was self-employed. Six percent were employed part-time, while 85% were employed on a full-time basis. One percent was either retired or a student; 7% were not employed. Over 92% of sample respondents were non-Hispanic whites.

Analysis Approach

Structural equation modeling (SEM) was employed to test the research hypotheses. More specifically, factor analytic structural equations using indicator and latent variables were used to examine causal pathways as conceptualized in the literature. The value of SEM is that the method allows the modeling of factor intercorrelations through a combination of total, direct, indirect, spurious, and residual effects (James, Mulaik, & Brett, 1982). Further discussion of the process is discussed below.

Measures

In this study, three latent variables were developed using several observed indicators: Environmental Profile (ENV Profile), Biopsychosocial Profile (BPS Profile), and Risk Behavior (Risk Beh). The environmental and biopsychosocial profiles were exogenous latent variables used to predict both risk tolerance and risk behavior. Risk tolerance was assumed to be associated with risk-taking behavior directly.

The environmental profile variable was hypothesized as a three factor structure consisting of self-assessed net worth, financial satisfaction, and household income. Respondents were asked to respond to the following question as a measure of net worth: "Suppose you were to sell all of your possessions (including your home), turn all of your investments and other assets into cash, and pay all of your debts. Would you be in debt, break even, or have something left over?" Respondents circled a number ranging from 1 to 10, with 1 indicating serious debt and 10 show-

ing that the person would have money left over. The mean and standard deviation net worth score for respondents were 7.6 and 2.6, respectively. The mean score suggests that the average respondent would more than break even if faced with this situation. Financial satisfaction was measured by asking respondents to indicate, on a scale of 1 to 10, the number that represented how satisfied they were with their present financial situation (1 = extremely unsatisfied to 10 = extremely satisfied). The item was adapted from a question in the Federal Reserve Board's SCF survey (Kennickell, 2003). On average, respondents were modestly satisfied (M = 5.6, SD = 2.0). The third factor, household income, had a median range that fell between $50,001 and $60,000 for respondents. Actual reported categories of income were used in the analysis.

The biopsychosocial profile was hypothesized to be composed of three factors. Self-esteem was assessed using a four-point 10-item Likert-type scale. The scale was similar to one developed by Rosenberg (1965) and later revised by Didato (2003). Examples of items include: (a) I am usually comfortable and poised among strangers; (b) I am often jealous or envious of others; (c) I always accept compliments without feeling embarrassed; and (d) I openly show recognition and appreciation when others do something noteworthy. The scale's reliability was a = .65, with scores ranging from a low of 10 to a high of 40, with a mean of 30.6 (SD = 3.5). Age, the second factor, was measured as an interval variable and used in the analysis as reported by respondents. The third factor, gender, was coded men 1, otherwise 0.

Financial risk tolerance was measured using a 13-item scale (Grable & Lytton, 1999). The scale has been used in a number of financial planning surveys (e.g., Grable & Joo, 2004; Yang, 2004), as well as by financial services firms as a method for assessing clients' financial risk tolerance. Grable and Lytton (2001) conducted a validity test to compare the scale to the Survey of Consumer Finances' (SCF) risk-assessment item, which is the only single-item risk measure used in Federal Reserve Board surveys of consumers. They reported a statistically significant correlation of r = .54 (p < .05) between the two measures. Scale scores for respondents in this study ranged from 14.0 to 34.0 (M = 23.2, SD = 4.1). The reliability of the scale was a = .70, which was similar to estimates reported in the literature (e.g., .70 to .85) (Yang, 2004).

Risk-taking behavior was the outcome variable in this study. Respondents were asked, as part of the survey, to

indicate if they engaged in or experienced certain negative and harmful financial activities and events during the past year (i.e., behavioral outcomes). The latent risk-taking behavior variable was hypothesized to be comprised of four factors. Each factor was dichotomously coded. Those who indicated that their wages had been garnished (1% of sample) were coded 1, 0 otherwise. Those who had filed for bankruptcy (3% of sample) were coded 1, 0 otherwise. Respondents who had received an overdue notice from a creditor (16% of sample) were coded 1, otherwise 0. Finally, those who had a vehicle repossessed (2% of sample) were coded 1, otherwise 0. In effect, the outcome variable was an indicator of money mismanagement action (i.e., risky financial behavior).

Analysis Method

An SEM approach using AMOS® 6.0 for SPSS was used to test the conceptual framework (Figure 2). SEM employs schematic diagrams similar to what one would find in a path model. Basically, the visual representation of the model describes a series of regression equations that are used to express the causal effects of variables (Byrne, 2001). SEM is widely used and appropriate when conduct-ing exploratory research. The method is designed to ac-count for measurement error, latent constructs, and ob-served variables in the generation of simultaneous coeffi-cient estimates (Rindskopf & Strauss, 2004). According to Aragon and Gessell (2003), SEM is an appropriate statisti-cal technique whenever error needs to be estimated and isolated in such a way that the true variance related to conceptualized variables emerges in the hypothesized model. Standard SEM and path modeling nomenclature was utilized in this study. Straight lines from the ENV Profile and BPS Profile to Risk Tol and Risk Beh denote direct causal effects. The curved double-arrow line be-tween the ENV Profile and BPS Profile indicates a hy-pothesized covariance between these two constructs. Uni-directional arrows from the ENV Profile to NetWrth, FinSat, and HH Inc suggest that the ENV Profile is a latent construct hypothesized to be comprised of the three ob-served variables. The same holds true for the straight lines from the BPS Profile to SE (i.e., self-esteem), Age, and Gender. Error terms shown in Figure 3 are denoted by circles with arrows pointing to a variable. Error terms are used in SEM and path analysis to account for the possibil-ity that a variable is affected by other variables in the

Figure 3. Specified Model of the Principal Factors Associated with Risk-Taking Behavior
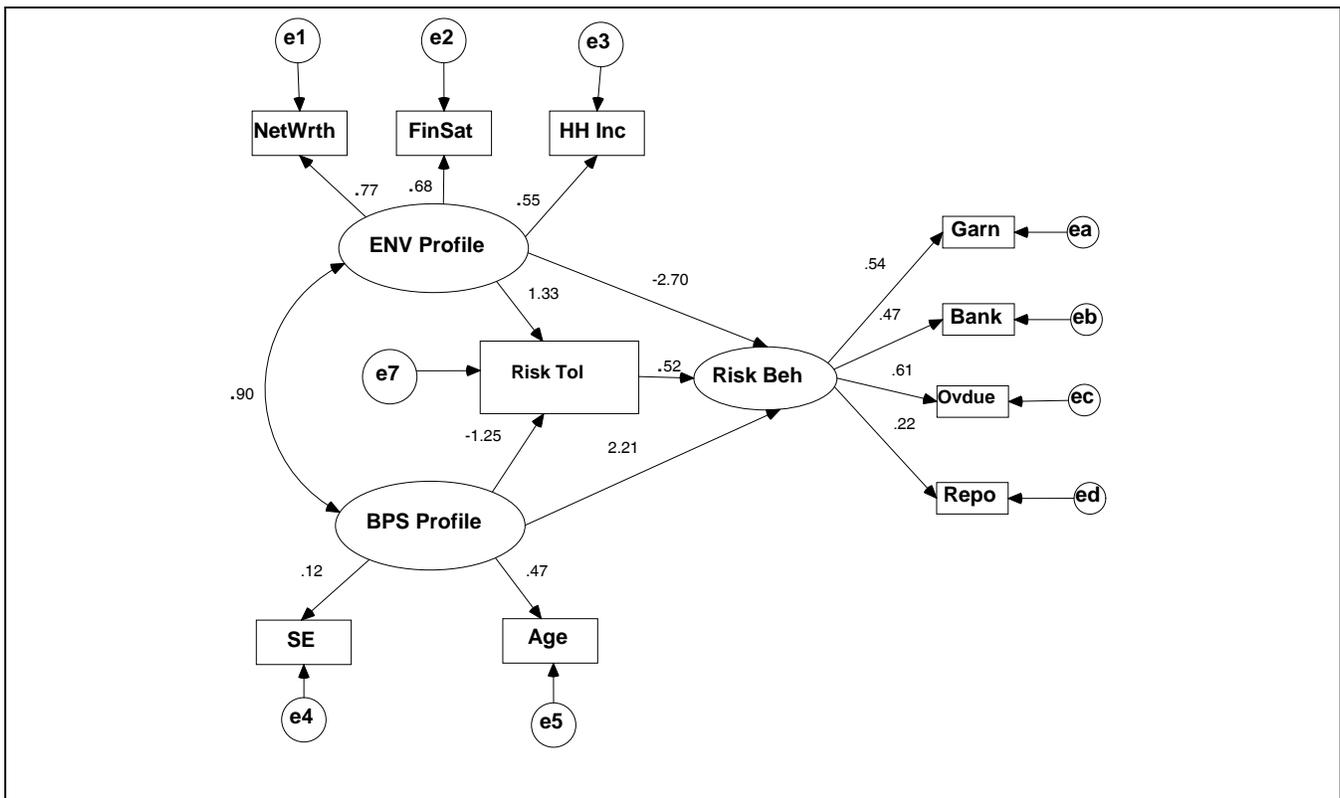
Table 1. Bivariate Correlations Between Key Variables

	Net Wrth	FinSat	HHInc	Age	Gender	SE	Risk Tol	Repo	Bank	Garn	Ovdue
Net Wrth	1.00										
FinSat	.53**	1.00									
HHInc	.40**	.41**	1.00								
Age	.37**	.20**	.24**	1.00							
Gender	-.02	.02	.07	.02	1.00						
SE	.06	.14**	.05	.13**	.02	1.00					
Risk Tol	.15**	.13**	.21**	-.05	.15**	.12*	1.00				
Repo	-.15**	-.11*	-.11*	-.03	.01	-.01	-.01	1.00			
Bank	-.20**	-.17**	-.13**	-.02	.03	-.02	-.09	.14**	1.00		
Garn	-.16**	-.20**	-.07	-.03	-.05	.03	-.01	.17**	.32**	1.00	
Ovdue	-.33**	-.33**	-.22**	-.13**	-.03	-.03	-.13**	.04	.32**	.25**	1.00

*$p < .01$. **$p < .001$.

model. For the purposes of this study, Pearson product-moment correlations and standardized partial regression coefficients were estimated, using maximum likelihood procedures, to determine effects among the variables.

Results and Discussion

Table 1 shows the bivariate correlations between key variables of interest in this study. As anticipated, environmental factors were found to be positively associated with risk tolerance and negatively associated with risk-taking behavior, as measured with money mismanagement outcomes that result in decreased wealth. Relationships among risk tolerance, risk taking, and biopsychosocial factors were also as generally expected. Age was negatively associated with risk tolerance while being male and having high self-esteem were positively related to risk tolerance. Age was also negatively associated with harmful financial behaviors. Relationships were mixed in terms of the association between gender, self-esteem, and risk-taking behavior.

Figure 3 shows the final specified model with all statistically significant causal pathways and associated standardized regression coefficients illustrated (non-significant paths are not shown). Specification refers to the process of

determining if the conceptualized model can be improved in terms of explaining relationships between and among variables (Schumacker & Lomax, 2004). It was determined that the original conceptualized model provided a reasonably good fit to the data; however, after using specification search functions within AMOS®, it was determined that a better fitting model could be developed. This is the model shown in Figure 3. Table 2 displays the statistical and practical indices of fit for the final specified structural equation model (Figure 3).

The initial chi-square value (Table 2) indicated that the model did not perfectly fit expected covariances within the population. This was not unexpected. A large chi-square is anticipated in nearly all structural equation models when the sample size is not extremely large (Byrne, 2001). Rather than depend solely on the chi-square measure as an indicator of a model's usefulness, nearly all researchers rely instead on goodness-of-fit indices that allow for a more pragmatic approach when evaluating models with modest-sized samples. Probably the best known and most widely used index is the comparative fit index (CFI). The CFI is a revised version of the normed fit index (NFI), and is appropriate for use whenever a small sample is used in an SEM. NFI and CFI values can range from 0 to 1.0.

Table 2. Statistical and Practical Indices of Fit for Final Structural Equation Model

Model	DF	CHI^2	IFI	NFI	CFI
Figure 3	31	84.34**	.92	.88	.92

*$p < .05$. **$p < .001$.

Values provide a "measure of complete covariation in the data" (Byrne, p. 83). In general, a minimum cut-off value near .90 is expected for CFI and NFI scores (Bentler & Bonett, 1980). Similarly, the incremental index of fit (IFI) measure is often used to account for sample size when evaluating how well a model fits the data. An IFI of .90 is usually considered acceptable. Based on these indices of fit, it was determined that the model was satisfactory in providing a basis for testing the research hypotheses.

Hypotheses Results
Profile Correlations
The first hypothesis tested in this study was that a person's environmental and biopsychosocial profile will be highly correlated. Results supported this hypothesis. In effect, a respondent's level of affluence (i.e., ENV Profile) was positively associated with their biopsychosocial profile (BPS Profile) ($r = .90$), which in the final specified model was comprised of self-esteem and age. For example, it is likely that older working individuals with a high level of self-esteem, exhibit higher levels of financial affluence.

Environmental Profile Results
As hypothesized, a person's environmental profile can be described by their net worth, financial satisfaction, and level of household income (i.e., hypothesis 2). It was also determined that a person's environmental profile has a positive effect on risk tolerance (i.e., the willingness to engage in a risky behavior) but a negative effect on money mismanagement behavior (i.e., hypothesis 4). As shown in Figure 3, net worth, financial satisfaction, and household income had high positive factor loadings on the latent environmental profile variable. Each factor loading was statistically significant. Respondents who shared a profile of having high net worth, high financial satisfaction, and high household income were statistically more likely to have an enhanced willingness to engage in risk-taking behavior but a lower likelihood of actually exhibiting harmful financial risk-taking behavior that could lead to a negative outcome, such as filing for bankruptcy or receiving overdue notices from creditors. In other words, those who shared an affluent profile were, on the one hand, in a position to take financial risks. Their wealth and income, on the other hand, appear to be a shelter from harmful financial behavior and associated negative outcomes.

Biopsychosocial Profile Results
Only partial support was provided for the hypotheses related to a person's biopsychosocial profile. As illustrated in Figure 3, a person's biopsychosocial profile can be described by self-esteem and age. Gender was not a significant factor associated with a person's biopsychosocial profile. Therefore, hypothesis 3 was not sustained. As initially conceptualized, a person's biopsychosocial profile was expected to be positively associated with risk tolerance but negatively related to harmful risk-taking behavior. In fact, the results were opposite of those hypothesized. Therefore, hypothesis 5 was also rejected. Much of this finding is the result of gender not being a significant factor in describing the biopsychosocial profile. In essence, being male or female was irrelevant in terms of describing a person's biopsychosocial profile. It is important to note, however, that this result may be related to the sample having more females than males. Instead, age and self-esteem were the dominant factors. Older individuals (as measured in this study – i.e., older working adults) and those with high self-esteem were less likely to be willing to take financial risks. Even though self-esteem was positively associated with the biopsychosocial profile and positively correlated with risk tolerance (Table 1), this effect was not as important as the age factor. The results related to risk-taking behavior show that a person's age and level of self-esteem are, by themselves, unlikely to shelter a person from harmful financial circumstances. If self-esteem is assumed to be held constant, older individuals are to be more likely to engage in money mismanagement behavior with negative outcomes. This may be due, in part, to the possibility that older working adults are more likely to encounter wage garnishments, bank overdrafts, overdue notices from creditors, and bankruptcy than others. This finding also suggests that environmental factors, particularly those that result in an affluent profile, are of primary importance when it comes to sheltering individuals from harmful financial circumstances. Support for this assertion is found in the positive correlation between the environmental and biopsychosocial profiles. Those who share the profile of being older, with a given degree of self-esteem, are more likely to be subject to negative financial circumstances. This is offset by the environmental profile, especially for those with high net worth and household income.

Risk Tolerance Results
Support for hypothesis 6 was found in this study. Financial risk tolerance, as a precipitating factor, was shown to have a positive effect on risk-taking behavior. Those who exhibited increased risk tolerance, as measured with a valid and reliable scale, were more likely to exhibit risk-taking behavior. The fact that the behavior being studied was negative did not alter the hypothesis findings.

Discussion and Implications

Two outcomes were expected from this research. The first was to identify mechanisms that influence persons' susceptibility to risk-taking financial behavior. The second was to provide researchers, financial services practitioners, and policy makers with a tool that can be used to better understand the interrelationships among behavior and frequencies of specific financial behavior. Both research outcomes were achieved.

In the first case, it was found that environmental and biopsychosocial profiles appear to work well as a mechanism for describing and predicting financial risk-taking behavior. Rather than relying on one key personal characteristic, such as household income or gender to predict behavior, environmental and biopsychosocial profiles provide a broader picture of behavior. In the second case, support was shown for Irwin's (1993) intervention model for use in the personal finance field. The model of the principal factors associated with risk-taking behavior illustrates the interrelationships among environmental and biopsychosocial factors, financial risk tolerance (as a precipitating factor), and risk behavior.

In terms of a causal factor influencing risk tolerance and risk-taking behavior, a person's environmental profile was shown to take precedence over their biopsychosocial profile. It was noted that the biopsychosocial profile, as defined in this study, had a positive effect on risk-taking behavior. The implication for those interested in providing financial counseling and planning services is initially troublesome. It appears that older working people are more likely to engage in the mismanagement of their financial situation. There may be a number of reasons why this may be true. For example, the circumstances of older consumers might simply put them in positions where they are more likely to experience negative financial outcomes. An initial review of the findings suggests that older working consumers, holding self-esteem constant, are vulnerable to outcomes associated with negative behavior. However, this observation may lead to an incorrect conclusion unless the person's environmental profile is taken into account concurrently. The environmental profile was shown to be negatively associated with money mismanagement behavior. The total effect size of the relationship (i.e., direct and indirect effects) was larger than the total effect size of the biopsychosocial profile on risk-taking behavior (i.e., -2.01 versus 1.57, respectively). As such, it is possible to conclude that a person's level of affluence may be the key factor that leads someone to engage in

harmful financial behavior or, at a minimum, be susceptible to behavioral risks. The overall implication for personal finance practitioners and policy makers interested in these issues is clear; namely, older working consumers who are not affluent may face the greatest risks associated with harmful financial behavior. A person's environmental profile is a tool that can be used to minimize circumstances leading to negative financial behavior. Without a sufficient level of affluence, older individuals become acutely susceptible to dangers that jeopardize their financial stability.

The results from this study add to the existing body of literature in several ways. First, the use of generalized profiling, similar to the method used to describe socioeconomic status, was supported in this study. Environmental and biopsychosocial profiles appear to offer a new and useful technique to both describe and predict financial risk tolerance and financial behavior. Rather than relying on one personal characteristic to describe or predict behavior, it was shown that generalized profiles can offer a useful, if not better, explanation of financial risk tolerance and risk-taking behavior. Second, it was shown that a person's level of affluence, as described by the environmental profile, seems to act as a form of protection against outcomes associated with negative financial behavior. Age and self-esteem do not provide the same level of protection primarily because having money helps people avoid excessive debt and its negative consequences, whereas age and self-esteem cannot be used to repay debt or meet other financial obligations. Third, Irwin's (1993) intervention model was shown to be adaptable to the needs of the personal finance field. Specifically, environmental and biopsychosocial factors do, indeed, appear to be predisposing characteristics leading to or reducing risk-taking behavior. Additionally, risk tolerance, as a precipitating factor, was shown to be an important determinant of risk-taking behavior. Finally, taken together, results from this study suggest that the model of the principal factors associated with risk-taking behavior can be used in additional research and by policy makers as a tool to better understand and describe the causal effects of risk taking, particularly in the realm of personal financial management.

Given the findings from this study, it is important to acknowledge potential weaknesses in the research. For instance, while respondents in the study were actively engaged in daily money management behavior, the sample itself was skewed to include people who were relatively affluent and managing their financial situation well. Furthermore, more women than men responded to the survey.

It is possible that had another sample been surveyed the results might have differed. Also, while the behavioral outcomes tested in this study were deemed harmful, it is important to acknowledge that the majority of respondents managed their financial situation effectively. A replication of this study using a larger, more nationally representative sample, would be useful in confirming these exploratory results. Nonetheless, the core findings from the study indicate that the use of environmental and biopsychosocial profiles may be a key to unlocking the ambiguity associated with the causes of and susceptibility to harmful risky behavior.

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