

SUBJECTIVE WELL-BEING, NET WORTH, AND SAVINGS MODALITIES

by

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August 2020

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Master of Science

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ABSTRACT

Behavioral economics has found numerous factors outside of the traditional expected utility model that affect financial decisions. The bi-directional relationship between financial decisions and happiness (“subjective well-being”) is of particular interest to economics and society because of the centrality of happiness to the human condition. I investigate the relationship between net worth, its main components (risky assets, safe assets, homeownership, and retirement accounts), and three proxies for subjective well-being: optimism, cheerfulness, and life satisfaction. I find that net worth correlates positively with optimism, cheerfulness, and life satisfaction. Furthermore, optimism correlates with voluntary retirement contributions, cheerfulness and life satisfaction correlates with lack of safe investments, and life satisfaction correlates with homeownership. The magnitude of the effects confirms that financial decisions are heavily influenced by factors besides the traditional models based on rationality.

BIOGRAPHICAL SKETCH

Ross Everett Shulman was born and raised in Bellmore, New York. He graduated with a Bachelors of Arts in Political Science with a Minor in Economics from Emory University in 2016. He then studied at Cornell University as a Master's Student in Applied Economics and Management, where he worked under the supervision of Professor Vicki Bogan.

ACKNOWLEDGMENTS

I would like to thank my parents and friends for their support and Professor Bogan for her time, advising, and expertise.

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1. Introduction

In the past decade, the field of behavioral finance has explored possible influences on investment decision-making behavior that lie outside of the traditional expected utility model. Indeed, recent research has indicated that variables including physical health (Rosen and Wu, 2004; McGarry, 2004), mental health (Bogan and Fertig, 2013; Bogan and Fertig, 2018) and mood (Kamstra et. al. 2003) can all affect investment decisions and wealth allocation. Personality traits have also been shown to affect net worth (Gambetti and Giusbert, 2019; Leckelt et. al. 2019; Nabeshima and Saey, 2015). One of the most studied aspects of behavioral economics is the relationship between happiness and various economic outcomes. The literature gives us reason to suspect that well-being correlates with stock market participation and stock purchasing decisions, safe asset holding, homeownership, and retirement savings.

I investigate how happiness, or subjective well-being, affects asset allocation by using three well-being proxies: optimism, cheerfulness, and life satisfaction. I analyze the relationship between optimism and net worth; cheerfulness and net worth; and life satisfaction and net worth. Further, I investigate the connection between optimism, cheerfulness, and life satisfaction and the various components of net worth.

The correlations are interesting for multiple reasons. First, this research can help shed light on behavioral influences on asset allocation. Second, it is important to understand savings and investment decisions because they are crucial to individual well-being, especially during retirement. Understanding the determinants of asset

allocation can help shape policies that allows Americans to make better financial decisions. At the macroeconomic level, an increase in the U.S. savings rate could increase total national investment and the U.S. growth rate. Understanding the psychological influences on asset allocation is thus important to several entities: 1) wealth management firms and financial planners, who are looking to educate clients; 2) individuals themselves, so that they are aware of how their traits and biases may be influencing their investment decisions in potentially suboptimal ways; and 3) policymakers, so that they can understand who is prone to making suboptimal financial and retirement decisions and develop adequate solutions. Additionally, given that firm-level decisions are made by individuals, this information could also be important to any firm that manages a portfolio, so that they can make sure their employees make objective decisions for the company, perhaps by educating and debiasing them.

I find that optimism correlates with voluntary retirement account holding, cheerfulness correlates with lack of safe asset holding and lack of homeownership, and life satisfaction correlates negatively with safe asset holding, but positively with homeownership.

2. Review of Literature

2.1. Subjective Well-Being, Income, and Wealth

As the fields of psychology and economics have developed contemporarily, those at the intersection of these subjects have sought to understand the bi-directional relationship between them. Indeed, a wealth of literature has developed demonstrating

that mental health, mood, and personality traits affect consumer decisions. The subfield of “happiness economics” seeks to understand which economic decisions lead to happiness and, conversely, which decisions are induced by happiness.

The pursuit of happiness plays a central role in human existence, and philosophers have been pondering the nature of happiness and “the good life” since ancient times. Despite its centrality to existence, happiness is a difficult concept to define. Happiness is encompassed by the idea of subjective well-being, which itself includes cognitive evaluations of one’s life, happiness, satisfaction, positive emotions such as joy and pride, and negative emotions such as pain and worry (Stiglitz et. al. 2017). There are three main concepts of subjective well-being in the literature: evaluation (life satisfaction), experience (momentary mood), and eudemonia (purpose) (Dolan and Metcalfe, 2012). Subjective well-being has been found to be positively correlated with good health and longevity, and negatively correlated with mortality, hypertension, heart disease and other illnesses (Güven and Hoxha, 2015).

Much of the research within happiness economics has focused on the relationship between income and subjective well-being (Kahneman and Deaton, 2010; Diener and Biswas Diener, 2002, for example). The field was born with the publication of Richard Easterlin’s now famous 1974 paper, “Does economic growth improve the human lot? Some empirical evidence,” in which Easterlin demonstrated the existence of a positive correlation between subjective well-being and income within any given country at any given time. Since then, overall wealth (as opposed to income) has also been shown to be positively correlated with subjective well-being, most likely because it provides the

financial security to cope with bad times, save for the future, and generate income flow (Senik, 2014). Furthermore, wealth buffers against declines in subjective well-being due to disability (Smith et. al. 2005).

It was formerly believed that higher absolute wealth would correlate with greater subjective well-being since wealth allows for greater satisfaction of needs and goals, which itself is a predictor of subjective well-being (Diener and Fujita, 1995). While this hypothesized mechanism may still be true, it has been further shown that income continues to correlate with subjective well-being (albeit less so) even after basic needs are satisfied (Diener et. al. 2009, Sacks et al. 2012). Notably, Easterlin (1971) found that there was only a very weak effect of GDP per capita on national happiness when data was aggregated at the country-level or when the same country was compared to itself at a different time. This finding is most curious and has come to be known as “Easterlin’s Paradox”, for it suggests that economic growth does not improve happiness. Rather, according to Easterlin, people only care about their wealth compared to their fellow citizens (i.e. their relative wealth) rather than their absolute wealth. However, recent research seems to disprove both this idea and the very existence of the paradox (Veenhoven, 1991; Diener et. al. 1993). Sacks et. al. (2012) strongly refute the existence of Easterlin’s Paradox and conclude that happiness and income are positively correlated in a linear-logarithmic fashion within countries, between countries, and over time within countries. They note that Easterlin, in using income rather than the logarithm of income, failed to account for the fact that a constant percent increase in income requires a larger absolute increase for individuals in rich countries than for those in poor countries. The

authors do, however, agree with Easterlin's finding that the United States does not show a positive relationship between subjective well-being and income over time. In fact, subjective well-being in the U.S. has slightly decreased over time. However, Sacks et. al. (2012) conclude from worldwide data that the U.S. is the exception rather than the rule. Importantly, they also conclude that there is no "satiety point" after which additional income no longer increases subjective well-being. Cheung and Lucas (2015) confirm Stevenson and Wolfers' (2008) finding that higher income is associated with higher life satisfaction, most likely because higher income predicts a better standard of living, which itself predicts higher life satisfaction. This holds true both between people at any given time and within individuals over time.

A more recent finding in the field shows differential impacts of income on different measures of subjective well-being (Diener et. al. 2010b). Specifically, Diener et. al. (2010a) show that income is strongly correlated with "life evaluation" but had a much weaker impact on "positive feeling". They find that positive feeling is more influenced by measures of psychosocial well-being, such as the quality of intimate relationships. Regarding the debate about relative versus absolute income, they find that both are determinants of subjective well-being but that the effect of absolute income is larger. Importantly, they find that, compared to poor nations, income more strongly influenced life evaluation in wealthy nations, where basic needs are already met. This serves as further evidence that a satiety point does not exist.

2.2. Subjective Well-Being and Financial Behaviors

Savings are a primary component of individual wealth. Traditional finance models posit that investment decisions are a pure function of investors' discount rate and tolerance for risk, but we now know that investors are affected by mood and numerous behavioral biases, including, but not limited to, anchoring, overconfidence, excessive optimism, mental accounting, and framing (Ritter, 2003). Furthermore, many people do not invest in the stock market despite such an investment being consistent with most reasonable utility functions. About 75% of US households do not directly invest in equities or mutual funds (Board of Governors of the Federal Reserve System, 2017).

The literature relating happiness with risk is mixed, partially due to the fact that it is empirically difficult to tease out the difference between risk aversion and subjective probability weighting. For example, Goudie et. al. (2014) show that happy people are more likely to wear seatbelts because they are risk averse, and another study finds that happier people are more likely to have life insurance and savings accounts, but are less likely to own stocks and bonds. The authors note this is possibly due to the fact that happier people have more self-control and take more time to make decisions (Güven and Hoxha, 2015). Importantly, both studies fail to measure whether happier people simply attribute lower subjective probabilities to unlikely events. Johnson and Tversky (1983) investigate precisely this question and find that inducing positive (negative) affect in experiment participants leads to decreased (increased) subjective probabilities being attributed to risks ranging from divorce, depression, cancer, and accidents.

Optimism is formally defined as “the expectation that good things will happen to oneself” (Carver et. al. 2010), and it is distinct from the commonly associated traits of neuroticism, anxiety, and self-esteem. It would make sense that a more economically-rigorous definition of optimism contains some notion of probability weighting, and this is indeed the case: a recent cognitive neuroscience study suggests that optimism is best viewed as “a [Bayesian] prior belief about the probability of future reward” (Stankevicius et. al. 2014). Thus, for any given investment, we should expect that optimists attach a higher subjective probability to the investment’s success compared to pessimists. Indeed, studies have found that “optimistic people weight probabilities of investment gains more favorably than do pessimistic people, and are therefore relatively more risk-seeking” (Fehr-Duda et. al. 2006).

At the firm level, excessive optimism has been shown to lead to overbudget and late capital projects (Kahneman and Lovallo 2000), higher levels of leveraging (De C. Barros & Silveira, 2007) and overestimation of corporate earnings by financial analysts (Calderon, 1993). However, the effects on individual investment decisions have not been as well studied.

The literature on optimism and gambling gives us further reason to believe that optimism is associated with investing in equity. While investing in the stock market is not a gamble *per se*, many stock market participants do engage in gambling-like behavior (Kumar, 2009) and, given the stock market’s random daily movements, there is reason to believe that amateur investors view investing in stocks as a gamble rather than owning the right to a share of the future profits of firms. Literature on the relationship between

optimism and gambling shows that optimists are more likely than pessimists to expect to win at gambling. Additionally, pessimists reduce bets when past performance is poor, while optimists maintain their positive expectations and thus persist in gambling (Gibson and Sanbonmatsu, 2004). The failure of optimists to update their *a priori* probabilities is consistent with Sharot et. al., 2011 (but inconsistent with Stankevicius et. al., 2014). Thus, we would expect that drops in the stock market, especially recessions, encourage pessimists to withdraw from the market, leaving only more optimistic people invested. The possibility of this behavior is supported by the well-known fact that amateur investors and even portfolio managers tend to “sell low” (Nesbitt, 1995).

Puri and Robinson (2007) find that an individual’s level of optimism is positively correlated with both positive expectations about the economy and personal income growth and savings, but they find no significant association between optimism and risk aversion nor between optimism and percent of wealth held in equities, though optimists are more likely to own individual stocks (i.e. they are more likely to “pick stocks”). After dividing optimists into “moderate optimists” and “extreme optimists”, they find that only moderate optimists have better financial habits than non-optimists; extreme optimists are less likely to save for the future and pay their credit cards on time compared to non-optimists, while moderate optimists are more likely to save for the future and pay their credit cards on time compared to non-optimists. Thus, they conclude that a moderate amount of optimism is associated with prudent financial decisions while extreme optimism is associated with imprudent decision-making. Importantly, they find the correlation between optimism and risk-taking is statistically significant but with a

correlation of less than 10%. Thus, optimism is not just a proxy for [lack of] risk aversion. In a recent article, Monroe et. al. (2017) find that while optimism may lead to positive beliefs about the future, future-oriented thought actually produces risk aversion as people seek to avoid potential losses or harm to their future selves. This is consistent with Guven and Hoxha (2015), who note that happy people tend to expect a longer life and thus invest in safer investments.

It is well-known that suboptimal subjective well-being states, such as depression and anxiety (and mental health issues in general), are associated with reduced sensation-seeking and willingness to take risk (Bogan and Fertig, 2012, Carton et. al. 1992, Carton et. al. 1995; Smoski et. al. 2008). As for the cause of this association, Grable and Roszkowski (2008) find support for the Affect Infusion Model (AIM) developed by Forgas (1995). According to this model, selective attention and priming cause people to focus their attention on positive environmental cues when they are in a good mood, causing subjective probabilities about positive events to be higher. Conversely, when in a bad mood, people focus their attention on the negative cues and weight subject probability of negative events higher. More recently, and consistent with the direction predicted by AIM, depression has been linked to a decrease in risk tolerance, resulting in changes in risk aversion so large that they can be observed on a macro level in the stock market: during months of shortened daylight, which is when seasonal affective disorder (a form of depression) emerges, the demand for risky assets decreases and share prices decline accordingly (Kamstra et. al. 2003).

On the other hand, the Mood Maintenance Hypothesis predicts that people in good moods are more risk averse than those in a normal mood because they are trying to preserve their current, positive emotional state. Consistent with this hypothesis, Delis and Mylonidis (2015) use an instrumental variables approach to find that happiness is associated with a 13.2 percentage point drop in the probability of owning risky financial assets, and a 10.1 percentage point drop in the probability of owning insurance products. Similarly, Isen and Patrick (1998) find that elated experiment participants bet more than control subjects on low-risk bets and less than control subjects on high-risk bets in an attempt to preserve their elated mood.

Importantly, mood is a “transient affective state”. While extensive research has been carried out on the effect of mood on risk aversion, little evidence exists about the effect of more permanent affective states, such as life satisfaction. Life satisfaction is related to but partially independent from (and discriminable from) positive and negative affect (Lucas et. al. 1996). Furthermore, mood contributes relatively little to life satisfaction, and life satisfaction is a much more stable judgment about subjective well-being, with a retest correlation of 0.82 over a 2-month period and 0.54 over a 4-year period (Shimmack et. al. 2002).

Ruberton et. al. (2016) find that increased liquid wealth is associated with increased life satisfaction because it provides a perception of financial well-being. Additionally the literature indicates that happier people save more because they have lower discount rates (Güven 2012, Ifcher and Zarghamee 2011). However, in the absence of an experiment, it is impossible to discern effects due to discount rates from effects due

to risk aversion. Importantly, there is also a possible confounding effect of wealth: wealth is a determinant of both stock market participation and life satisfaction.

2.3. Subjective Well-Being and Homeownership

Compared to the literature on the effect of subjective well-being on income and investments, the literature on subjective well-being and home ownership is scant. Nonetheless, there are some interesting results. Homeownership may be a significant mediator/confounder in the relationship between subjective well-being and wealth due to the cultural and personal meaning of homeownership and the fact that it represents a majority of the net worth of lower- to middle- income Americans (Boehm and Schlottmann, 2008). Indeed, there is some evidence for the commonly-held assertion that owning a home provides a sense of self-efficacy, self-esteem, and success (Rossi and Weber, 1996). These could be the pathways through which homeownership increases happiness. However, Rohe and Basolo (1997) find no relationship between homeownership and self-esteem or perceived control. Importantly, they do still find a positive and significant effect of homeownership on life satisfaction, though they are unsure of the cause having refuted the commonly-held ones.

Noting the issues with self-selection into renting and homeownership, Ruprah (2010) improves upon previous studies by establishing a causal connection between home ownership and life satisfaction in Latin America. Similarly, by leveraging data in which people buy the same home that they formerly rented, Diaz (2009) finds that homeownership does indeed increase subjective well-being. Finally, there is further

evidence found in Germany for a positive and significant relationship between home ownership and life satisfaction (Zumbro, 2014).

2.4. Subjective Well-Being and Retirement Accounts

The shift from defined benefit plans to defined contribution plans in the United States has been ongoing. In 1985, voluntary contributions plans made up about 18% of all pensions and by 1992 they comprised almost 50% of all pension plans (Papke, 1996). They now comprise approximately 75% of pension plans (EBRI, 2019). It has been shown that participation in voluntary contribution plans is positively influenced by income, age, education, and homeownership, while it is negatively correlated with marriage (Bassett, 1998; Madrian and Shea, 2001; Benartzi and Thaler, 2013). Benartzi et. al. (2013) show that numerous behavioral factors, such as procrastination and inertia, affect voluntary pension contributions. For example, automatically enrolling employees in a 401(k) plan increases the participation rate and automatically escalating the contribution amount increases the average contribution amount, even though the employee has the possibility to opt-out. According to rational choice models, these changes should have no effect on retirement savings. Thaler thus suggests that companies “nudge” employees by automatically-enrolling them in 401(k) plans and giving them the option to opt-out rather than asking if they would like to enroll. More recently, Bogan and Fertig (2018) find that psychological distress is associated with a decreased probability of holding retirement accounts and that those with psychological distress hold a smaller share of financial assets in retirement savings. As the literature demonstrates the impact of behavioral biases on

retirement account decisions, I continue to explore it by focusing on the effect of well-being on retirement decisions.

3. Data

The data in this study come from the Panel Study of Income Dynamics (PSID), a large, nationally representative panel survey conducted in the United States since 1968. As a comprehensive, nationally representative survey, it is useful for understanding determinants of wealth and income and contains detailed physical health and mental health variables. Specifically, I leverage data from the 2016 Health and Well-Being Supplement, a one-time supplement that asks individual respondents about their life satisfaction, emotions, experienced well-being, personality, mental health, and general reasoning skills. The supplement had 8,341 respondents. I then match the responses to the respondents' answers in the general survey administered in 2017, which had 26,445 respondents and is a superset of the supplement respondents. (The regular PSID was not administered in 2016.) The general survey includes questions about individual and family income, wealth, investments, and health. Using these data, I investigate the relationship between well-being and financial decisions.

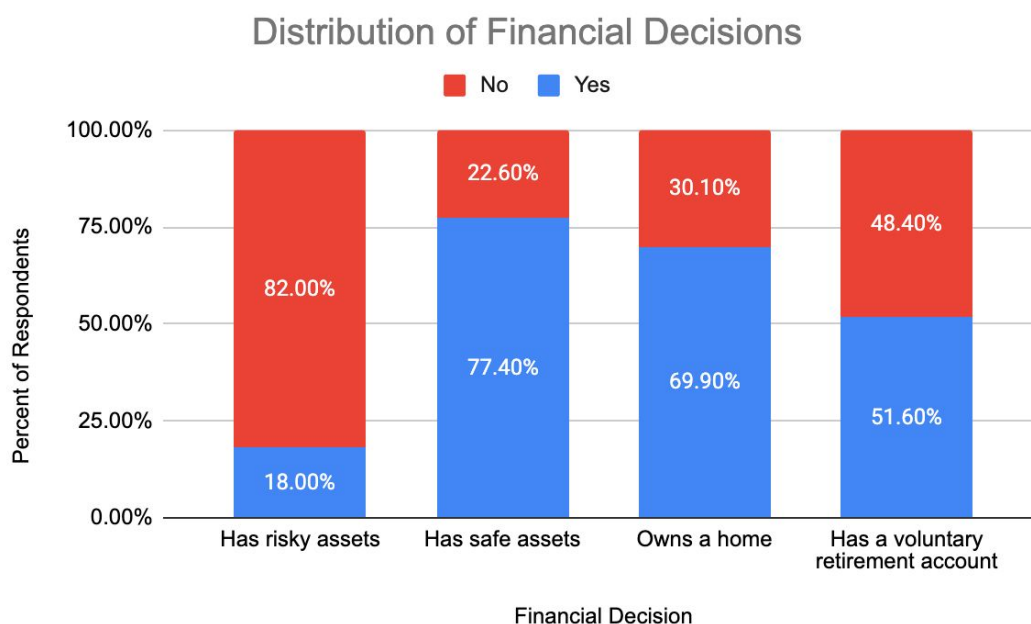
My sample contains 7,243 observations (out of 8,341 respondents in the supplement). Over 99% of respondents in the supplement answered the optimism, life satisfaction, and cheerfulness questions; only 118 responses were dropped for lack of response to optimism, cheerfulness, and life satisfaction questions. After dropping these missing values, I dropped respondents who were missing answers to the relevant financial

questions. Specifically, 336 observations (4.0%) were dropped for missing answers to the question about stock ownership, and 30 (<1%) further observations were dropped for missing answers to the question about safe asset holding. I then proceeded by dropping respondents who were missing answers to the control variables. Specifically, 4 respondents were dropped for missing response to the question about inheritance, 51 respondents were dropped for missing response to the question about whether they were of hispanic origin, 359 respondents (4.3%) were dropped for missing responses to the question testing cognitive abilities, 91 respondents were dropped because they did not have a K-6 score, 62 respondents were dropped because their education level was missing, 11 respondents were dropped because their employment status was unknown, and 36 respondents were dropped because their financial distress indicator was not able to be calculated.

3.1. Financial Decisions

The key financial decisions that I will investigate are whether the respondent possesses risky assets, safe assets, a home, or a voluntary retirement account. Chart 1 shows that, within my sample, 18% of participants hold risky assets, 77.4% hold safe assets, 69.9% are homeowners, and 51.4% hold voluntary retirement accounts.

Chart 1: Distribution of Financial Decisions



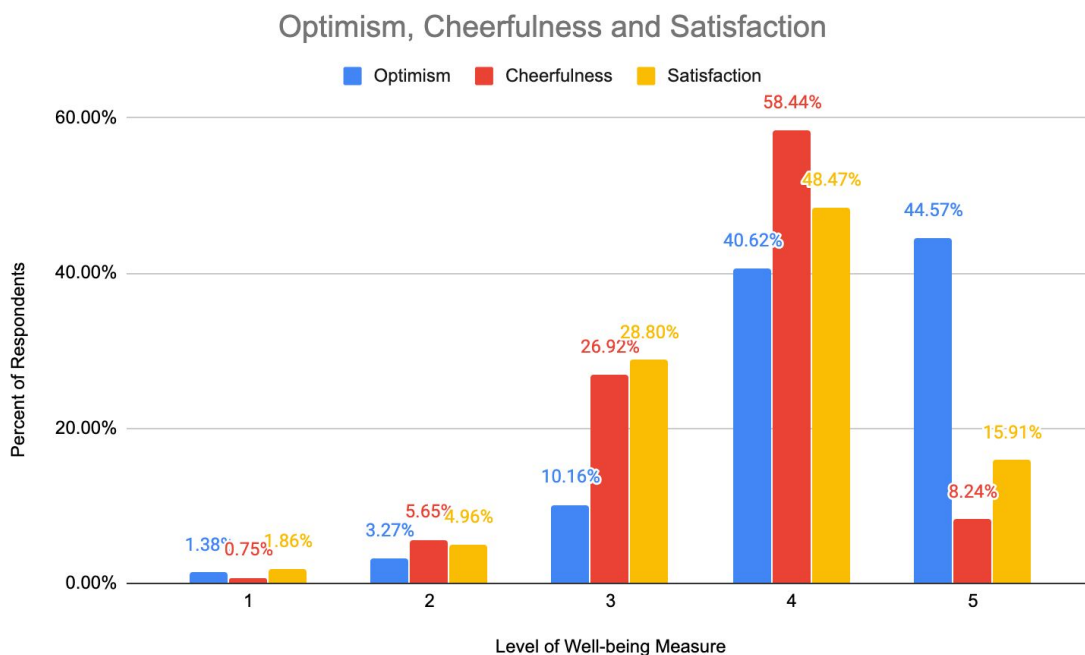
Observations: 7,243

3.2 Well-Being Measures

Self-reports of subjective well-being measures have been shown to accurately measure actual well-being (Sandvik et. al. 2009). Furthermore, optimism, life satisfaction, and affect (for which cheerfulness is a proxy), have all been shown to be discriminable from each other (Lucas et. al. 1996). My well-being measures, which are the independent variables, are ordinal and range from 1 to 5, where 1 indicates “none of the time” or “strongly disagree” and 5 indicates “all of the time” or “strongly agree”, depending on context. These variables come from the 2016 Health and Well-Being Supplement. As a

proxy for optimism, I use the question: “How much do you agree or disagree: I am optimistic about my future.” As a proxy for cheerfulness, I use the question: “During the past 30 days, how much of the time did you feel cheerful?”. As a proxy for life satisfaction, I use the question: “How satisfied are you with your life as a whole these days?”. Looking at Chart 2, we see that 85% of respondents rate themselves as “4” or “5” in optimism. I also create an “very optimistic” dummy variable that is 1 if the respondent rates themselves a 4 or 5 on the main optimism question, and 0 otherwise.

Chart 2: Distribution of the Well-Being Measures



3.3. Control Variables

Per Bogan and Fertig (2018), I control for exogenous factors that are known to influence financial decisions: race, sex, age, and age squared. I also control for possibly endogenous factors that could influence financial decisions: having a defined benefit plan, physical health, having received an inheritance or settlement in the last year, cognitive skills, chronic physical conditions, mental health conditions, being employed, and being financially distressed.

Table 1: Summary Statistics of Control Variables

| <u>Control Variable</u> | <u>Mean</u> | <u>Median</u> |
|--|--------------------|----------------------|
| Age | 50.3 | 49 |
| Male | 44.7% | - |
| African American | 29.5% | - |
| Hispanic | 4.4% | - |
| Income (mean) | \$98,994 | \$75,700 |
| Net worth without home equity | \$312,415 | \$30,000 |
| Net worth with home equity | \$429,485 | \$100,000 |
| Received inheritance | 4.5% | - |
| Has a defined benefit retirement plan | 10.6% | - |
| Answered cognitive question correctly | 61.4% | - |
| K-6 score (out of 24) | 4.49 | 3 |
| Number of chronic diseases (out of the 6 listed in the PSID) | .92 | 1 |
| Years of education | 13.96 | 14.0 |
| Employed | 71.1% | - |
| Consumer debt / income ratio | 1.00 | .007 |

Observations: 7,243

4. Empirical Strategy

To analyze the relationship between financial decisions and well-being, I first run preliminary OLS regressions where the dependent variables are the household's net worth with and without home equity and the independent variables of interest (\mathbf{x}) proxy for well-being (optimism, life satisfaction, and cheerfulness). The net worth variable (y) is

continuous, and is an imputed value in the 2017 survey that sums seven major assets classes (farm/business, checking/savings accounts, real estate, stocks, vehicles, other assets, annuities/IRAs) and subtracts debt value (the sum of farm/business debt, real estate debt (besides debt on the primary home), credit card debt, medical debt, legal debt, loans from relatives, and other debts). This imputed net worth variable is calculated by the PSID and included as a variable in the dataset. The PSID actually has two net worth variables: one that includes home equity for the primary home in the wealth calculation and one does not. I will use models with each type of net worth. \mathbf{z}_i is a vector of the control variables.

The primary regression equation is:

$$(1) \text{ Net worth}_i = b_0 + b_1 x_i + \mathbf{z}_i + \varepsilon_i$$

For my main analysis, I then employ linear probability models (LPMs) to determine which components of net worth are driving the relationships seen in the preliminary regressions. I employ LPMs for two reasons. First, they allow for simple interpretation of marginal effects. Secondly, the LPMs that I estimate predict probabilities between 0 and 1 for over 90% of the observations in each regression, and the chance of bias in the LPM decreases as more observations fall within the unit interval (Friedman, 2012).

To perform the main analysis, I regress the binary variables for stock holding, safe asset holding, home ownership, and retirement account holding on optimism, life

satisfaction, and cheerfulness including the same control variables as I do in the preliminary regressions. I then run the same regressions but further control for net worth including home equity. To check for confounding between the well-being indicators, I repeat this same procedure with all three proxies included as independent variables.

The model used is:

$$(2) \text{ Asset class} = b_0 + b_1x_i + \mathbf{z}_i + \varepsilon_i$$

Finally, I am able to exploit the existence of a variable about the value of stocks held to regress value of stocks on my well-being indicators, again using the same controls. In accordance with the literature, I include only those respondents who hold a positive value of stocks to explore what is referred to as the “intensive margin” of stockholding.

The model used is:

$$(3) \text{ Value of stocks} = b_0 + b_1x_i + \mathbf{z}_i + \varepsilon_i$$

5. Results

The results of the preliminary regressions, in which the effects of optimism, cheerfulness, and life satisfaction on net worth are measured, are displayed in Table 2A and Table 2B. Optimism, cheerfulness, and (life) satisfaction are discrete variables from 1 to 5 where 1 equals strongly disagree and 5 equals strongly agree. Thus, the coefficient represents the increase in net worth due to being in the next highest level on the optimism/cheerfulness/satisfaction scale, with appropriate control variables. Optimism is positively correlated with and cheerfulness is weakly positively correlated with net worth when home equity is included. Only optimism remains significant when home equity is excluded. Life satisfaction is the best predictor both in the economic and statistical sense: being in the next highest level on the life satisfaction scale is correlated with an increase in net worth of \$41,999 ($p < 0.01$) when home equity is included (Table 2A). To give an idea of the economic significance of these findings, the median net worth including equity among respondents is \$25,000. The 25th percentile is \$9,300 and the 75th percentile is \$370,000.

Table 2: Net Worth

Panel A: Net Worth (Excluding home equity, net of debts)

| | (a) | (b) | (c) | (d) |
|-----------------------------|----------------------|---------------------|-----------------------|---------------------|
| Optimism | 37,032** (18,771) | | | 19,525 (20,385) |
| Cheerfulness | | 42,770* (23,178) | | 14,922 (25,907) |
| Satisfaction | | | 53,937*** (19,473) | 41,999* (21,957) |
| Exogenous Variables | Yes | Yes | Yes | Yes |
| Endogenous Variables | Yes | Yes | Yes | Yes |
| Observations | 7,243 | 7,243 | 7,243 | 7,243 |

Panel B: Net Worth (Including home equity, net of debts)

| | (a) | (b) | (c) | (d) |
|-----------------------------|---------------------|--------------------|----------------------|---------------------|
| Optimism | 33,100* (17,787) | | | 18,950 (19,318) |
| Cheerfulness | | 34,117 (21,964) | | 9,354 (24,551) |
| Satisfaction | | | 45,904** (18,453) | 36,064* (20,808) |
| Exogenous Variables | Yes | Yes | Yes | Yes |
| Endogenous Variables | Yes | Yes | Yes | Yes |
| Observations | 7,243 | 7,243 | 7,243 | 7,243 |

Coefficients are reported from the OLS model. Endogenous variables and the exogenous variables are defined in the Control Variables section.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Having seen a positive relationship between each of the well-being indicators and net worth, I now check the effect of these well-being indicators on each component of net worth to understand which components are driving the relationship. Unlike the net worth variable, which is continuous, all of the component variables are binary (0 = does not hold asset; 1 = holds asset). Thus, the coefficients represent the effect of a one unit change in the discrete well-being variables on the probability of holding each asset class. The results of the baseline regressions show that none of the well-being indicators significantly correlate with risky investment holding (Table 3). In Table 4, we see that when the dependent variable is “amount invested in stocks” instead of the binary variable about stock holding, none of the well-being indicators are significant when a net worth control is included.

Table 3: Risky Investment Holding (Yes/No)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-----------------------------------|----------------|----------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|
| Optimism | .004 (.005) | .002 (.005) | | | | | .004 (.006) | .004 (.006) |
| Cheerfulness | | | -.001 (.006) | -.003 (.006) | | | -.003 (.007) | -.004 (.007) |
| Satisfaction | | | | | .002 (.005) | -.001 (.005) | .002 (.006) | 0.000 (.006) |
| Wealth | No | Yes | No | Yes | No | Yes | No | Yes |
| Other Endogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Exogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 |

Coefficients are reported from the Linear Probability Model. The wealth variable includes home equity, but significance remains unchanged if home equity is excluded. The other endogenous variables and the exogenous variables are defined in the Control Variables section.¹

* p<0.1; ** p<0.05; *** p<0.01

¹ In regressions that control for net worth in this table and the following tables, I use the net worth variable that includes home equity. However, excluding home equity does not change the statistical significance of any of the results.

Table 4: Risky Investments (Value of Risky Assets)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-----------------------------------|--------------------|---------------------|--------------------|---------------------|-----------------------|-----------------|---------------------|---------------------|
| Optimism | 78,470 (64,170) | -27,491 (38,823) | | | | | 31,992 (70,918) | -31,305 (42,918) |
| Cheerfulness | | | 62,128 (88,751) | -12,616 (53,616) | | | -31,953 (99,131) | -6,161 (59,965) |
| Satisfaction | | | | | 166,599** (73,732) | 355 (44,745) | 163,333 (84,230) | 16,085 (51,045) |
| Wealth | No | Yes | No | Yes | No | Yes | No | Yes |
| Other Endogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Exogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 |

Coefficients are reported from the Linear Regression Model that considers all observations that had non-zero investments in stock. The other endogenous variables and the exogenous variables are defined in the Control Variables section.

p<0.1; ** p<0.05; *** p<0.01

As for safe investment holding (Table 5), cheerfulness and life satisfaction strongly correlated with holding a safe investment in the negative direction, and these differences are economically significant: being in the next highest level on the cheerfulness scale decreases the probability of holding safe assets by 2.7 percentage points. Similarly, being in the next highest level on the life satisfaction scale is associated with a 1.6 percentage

point decrease in the probability of holding safe assets ($p < 0.01$). Controlling for wealth does not change coefficient magnitude or significance for either of the dependent variables. In the regression that measures the combined effects of optimism, cheerfulness, and satisfaction on safe asset holding, the effect of cheerfulness remains steady. The magnitude of the effect of life satisfaction does not change, but it is no longer statistically significant.

Table 5: Safe Investments

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-----------------------------------|------------------|------------------|--------------------|--------------------|-------------------|--------------------|-------------------|-------------------|
| Optimism | -0.005 (.006) | -0.005 (.006) | | | | | .005 (.006) | .004 (.006) |
| Cheerfulness | | | -.027*** (.007) | -.027*** (.007) | | | -.024** (.008) | -.024** (.008) |
| Satisfaction | | | | | .016*** (.006) | -.017*** (.006) | -.010 (.007) | -.010 (.007) |
| Wealth | No | Yes | No | Yes | No | Yes | No | Yes |
| Other Endogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Exogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 |

Coefficients are reported from the Linear Probability Model. The wealth variable includes home equity, but significance remains unchanged if home equity is excluded. The other endogenous variables and the exogenous variables are defined in the Control Variables section.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 6 shows that life satisfaction is associated with home ownership and is both statistically ($p < 0.01$) and economically significant: being in the next highest level on the life satisfaction scale is associated with a 4.7 percentage point increase in homeownership. Again, controlling for wealth does not change coefficient magnitude or significance. In the regression that measures the combined effects of optimism, cheerfulness, and satisfaction on homeownership, a significant ($p < 0.01$) and negative effect of cheerfulness on homeownership emerges, and the effect of life satisfaction remains steady (Table 6).

Table 6: Homeownership

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-----------------------------------|----------------|----------------|-----------------|-----------------|--------------------|--------------------|---------------------|---------------------|
| Optimism | .007 (.006) | .007 (.006) | | | | | -.005 (.007) | -.004 (.007) |
| Cheerfulness | | | -.001 (.008) | -.001 (.008) | | | -.027 *** (.008) | -.027 *** (.008) |
| Satisfaction | | | | | .047 *** (.006) | .047 *** (.006) | .058 *** (.007) | .058 *** (.007) |
| Wealth | No | Yes | No | Yes | No | Yes | No | Yes |
| Other Endogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Exogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 |

Coefficients are reported from the Linear Probability Model. The wealth variable includes home equity, but significance remains unchanged if home equity is excluded. The other endogenous variables and the exogenous variables are defined in the Control Variables section.

* p<0.1; ** p<0.05; *** p<0.01

Table 7 shows that holding a voluntary retirement account is significantly related to optimism. Specifically, being in the next highest level on the optimism scale is associated with a 1.1 percentage point increase in the probability of having a retirement account, though significance disappears I control for wealth. This is the only regression in which controlling for net worth changes the statistical significance of the finding. When the

other well-being indicators are added to the regression, optimism is significant both with and without net worth. Furthermore, the size of the effect increases and has $p < 0.05$.

Table 7: Voluntary Retirement Accounts

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-----------------------------------|-----------------|----------------|-----------------|-----------------|----------------|----------------|-----------------|-----------------|
| Optimism | .011* (.007) | .010 (.007) | | | | | .013* (.007) | .014* (.007) |
| Cheerfulness | | | -.002 (.008) | -.003 (.008) | | | -.007 (.009) | -.007 (.009) |
| Satisfaction | | | | | .001 (.007) | .000 (.007) | -.001 (.008) | -.001 (.008) |
| Wealth | No | Yes | No | Yes | No | Yes | No | Yes |
| Other Endogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Exogenous Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 | 7,243 |

Coefficients are reported from the Linear Probability Model. The wealth variable includes home equity, but significance remains unchanged if home equity is excluded. The other endogenous variables and the exogenous variables are defined in the Control Variables section.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

6. Robustness Checks

In line with Sharot (2011), when I create a “very optimistic” binary variable, which equals 1 if and only if respondents rate themselves a 5 in optimism, I do find a moderately significant association between optimism and safe asset holdings: very optimistic people are 1.6% less likely to hold safe assets than people who are not very optimistic.

In Table 5, it is notable that cheerfulness and satisfaction are significant when they are the unique independent variable in the regression, but that satisfaction is no longer significant when optimism, cheerfulness, and satisfaction are all considered as independent variables in a single model. Though there is a theoretical suggestion that the various components of subjective are distinct, these results raise the concern of multicollinearity. The correlation matrix is shown in Table 8. Indeed, a strong correlation is observed between cheerfulness and life satisfaction, and a moderate-to-strong correlation is observed between optimism and life satisfaction and between optimism and cheerfulness. Furthermore, the variance inflation factors (VIFs) of optimism, cheerfulness, and life satisfaction are 1.45, 1.65, and 1.65, respectively, on the regressions that include all three independent variables. This confirms the suspicion of moderate multicollinearity. While these findings have implications for the point estimates of the marginal impact of optimism, cheerfulness, and life satisfaction, it is important to note that multicollinearity does not affect the predicted value of the dependent variable. Thus,

while it may be hard to tease out which component of subjective well-being is driving an effect, the size of the effect of subjective well-being in general does not change. The primary purpose of this paper is to highlight the effect of subjective well-being on mediators of net worth rather than disentangling the components of subjective well-being, and thus the results still reveal interesting findings. In particular, the regressions containing all three subjective well-being components contain the most accurate estimate of the effect of subjective well-being as a whole since this model has the highest R^2 .

Table 8: Correlation Matrix of the Subjective Well-Being Measures

| <u>Correlation</u> | Optimism | Cheerfulness | Life satisfaction |
|---------------------------|----------|--------------|-------------------|
| Optimism | 1.000 | .4498 | .4392 |
| Cheerfulness | .4498 | 1.000 | .5437 |
| Life satisfaction | .4392 | .5437 | 1.000 |

7. Discussion and Limitations

When the preliminary finding that optimism is positively correlated with net worth is investigated at the component level, I find that optimism only correlates with voluntary retirement contributions. This is consistent with Guven and Hoxha (2015), who note that happy people tend to expect a longer life and plan accordingly by investing in safer investments. Importantly, this study is limited in its potential to identify causality, and

there are plausible explanations for both possible directions: being optimistic about the future could lead to saving more for retirement, but having money saved for retirement could also make one optimistic about their future, since they will have money to provide for themselves.

While excessive optimism by managers causes firms to make objectively bad decisions (Sharot 2011), it is also possible that optimism could be beneficial at the individual level. For example, excessive optimism may encourage those who otherwise would not invest in stocks (due to cognitive or informational limitations, for example) to do so. This is beneficial to young investors with a long time horizon since a diversified stock market portfolio has a higher expected return compared to bonds or cash. However, I find no association between stock holding and optimism nor between stock holding and extreme optimism, though extreme optimists are less likely to hold safe assets. Indeed, it seems that optimistic people simply choose not to save for the future rather than to save by investing in more risky assets.

When the preliminary finding that cheerfulness is positively correlated with net worth is investigated at the component level, I find that cheerfulness is correlated with *lack* of safe investments. This is consistent with the literature indicating that happy people take more risks, though, similarly to the optimism variable, we do not see a significant relationship between cheerfulness and risky-asset holding. Thus, I only conclude that more cheerful people are less likely to invest in safe assets such as bonds. The direction of this relationship is the opposite of that found at the aggregate (total net worth) level.

Regarding the correlation between life satisfaction and net worth, we again see a negative correlation between our well-being measure and safe account holding. Importantly, though the literature indicates life satisfaction and cheerfulness are distinct measures, life satisfaction is no longer a significant predictor when both are included in the regression (Table 5, Column 8), so these two variables are probably capturing similar conceptions of well-being. Regarding other components of net worth, we see statistical significance of the positive correlation between homeownership and life satisfaction.

This study is limited by the fact that the PSID well-being supplement has been administered a single time (2016). If the well-being supplement were to be administered again, it would give us the possibility to investigate changes in optimism, cheerfulness, and satisfaction and use fixed-effects to ascertain direction and causality. Another limitation is the subjectiveness inherent in defining and measuring the constructs of optimism, life satisfaction, and cheerfulness. While the components I use are distinguishable from each other, the very notion of subjective well-being and its components is relatively new and still being actively explored. Furthermore, the subjective well-being measurements in the PSID are ordinal, but I assume they are continuous for the purpose of modelling the data. While the careful reader will have noticed the self-reported nature of the independent variables, I do not consider this to be a limitation, as self-reports have been shown to reliably measure actual well-being (Sandvik et. al. 2009).

An interesting question to further investigate is whether changes in macroeconomic conditions can affect net worth and its components not only through

economic gains/losses but also through changes in “behavioral” decision making. That is, do recessions cause not only economic decline but also changes in subjective well-being and thus, through the mechanisms proposed in this paper, changes in net worth allocation? Wolfers (2003) finds that increased unemployment during the bottom of the business cycle does cause a decrease in happiness and life satisfaction. Thus, this is an interesting area for exploration.

8. Conclusion

Happiness economics remains a nascent subfield with much room left for exploration. While it has long been common knowledge “not to make important decisions while angry”, the field has further and more rigorously identified various behavioral influences on decision making. This paper investigates whether various measures of subjective well-being are related to wealth and the ways in which it is stored. My results indicate that subjective well-being is most certainly correlated with net worth and its various components, though my study suffers from difficulty in identifying causality. Establishing causality through panel data or other methods would thus be a useful next step in this field. In the meantime, my research adds to the literature indicating that behavioral factors play a role in economic-decision making. Specifically, subjective well-being is a significant correlate with net worth and its underlying components. Acquiring financial resources and allocating them is thus far from a simple calculation based on traditional financial models. As we understand more and more about how psychological traits,

including personality and well-being, affect economic decision-making, we can more accurately make decisions both as individuals and as a society.

9. Appendix

Subjective Well-Being Variables

Optimism - A discrete variable ranging from 1 to 5 that asks, “How much do you agree or disagree: I am optimistic about my future”, where 1 = strongly disagree and 5 = strongly agree.

Very optimistic binary - A dummy variable equal to 1 if the respondent’s level of optimism was 5, and equal to 0 if the respondent’s level of optimism was 1, 2, 3, or 4.

Cheerfulness - A discrete variable ranging from 1 to 5 that asks, “During the past 30 days, how much of the time did you feel cheerful?” where 1 = none of the time and 5 = all of the time.

Life satisfaction - A discrete variable ranging from 1 to 5 that asks, “How satisfied are you with your life as a whole these days?” where 1 = not at all satisfied and 5 = completely satisfied.

Financial Decision Variables

Risky asset holding - A dummy variable equal to 1 if the respondent answered affirmatively to the question, “Do you [or anyone in your family living there] have any shares of stock in publicly held corporations, stock mutual funds, or investment trusts--not including stocks in employer-based pensions or IRAs?”. The variable is given a value of 0 otherwise.

Safe asset holding - A dummy variable equal to 1 if the respondent answered affirmatively to the question, “Do you [or anyone in your family living there] have any shares of stock in publicly held corporations, stock mutual funds, or investment trusts--not including stocks in employer-based pensions or IRAs?”. The variable is given a value of 0 otherwise.

Homeownership - A dummy variable equal to 1 if the respondent said that they owned a home when asked, “Do you (or anyone else in your family living there) own the (apartment/mobile home/home), do you pay rent, or what?”, and was set to 0 otherwise.

Voluntary retirement contributions - A dummy variable equal to 1 if the respondent answered affirmatively to themselves or their spouse holding a private annuity, an Individual Retirement Account (IRA), a defined contribution plan or any tax-deferred

compensation or savings plans such as a "thrift", profit-sharing, or Keogh plans. The variable was set to 0 if neither the respondent nor their spouse held any of these plans.

Control Variables

Net worth - This variable is imputed by summing the values of 7 different asset types, including home equity, and net of debt.

Income - This variable is the amount of income reported for tax year 2016 for both partners, and can be negative if the household had a net loss in their business or farm.

Financial distress - Per Bogan and Fertig (2018), this is the value obtained from taking the value of household consumer debt (including credit card charges, student loans, medical or legal bills, or loans from relatives (but not any mortgage on a primary residence or vehicle loans) and dividing it by household income.

Male - A dummy variable set to 1 if the respondent is male, and 0 otherwise.

Age - A variable equal to the age of the respondent.

Age-Squared - A variable equal to the squared age of the respondent.

African American - A dummy variable set to 1 if the respondent is African American and set to 0 otherwise.

Hispanic - A dummy variable set to 1 if the respondent is Hispanic and set to 0 otherwise.

White - A dummy variable set to 1 if the respondent is White and set to 0 otherwise.

Education - A variable ranging from 0 to 17 that indicates the highest grade that the respondent has completed. (13-17 represent the years of an undergraduate degree.)

Cognitive abilities - A dummy variable set to 1 if the respondent correctly answered the following question and set to 0 otherwise: "A used car dealer is selling a car for \$6,000. This is two thirds of what it cost new. How much did the car cost new?"

Employed - A dummy variable set to 1 if the respondent was employed for more than 40 weeks in 2016.

Defined benefit plan - A dummy variable set to 1 if the respondent or reference person participates in a defined benefit retirement plan, and 0 otherwise.

Inheritance - A dummy variable set to 1 if anyone in the household received a large lump sum payment, such as an insurance settlement or an inheritance, in 2016.

Chronic Physical Conditions - This variable counts how many of the following six chronic diseases the respondent has had: high blood pressure, diabetes, cancer, lung disease, heart disease, and arthritis.

K-6 Depression Score - The mental health control uses responses from the PSID to create the K-6 non-specific psychological distress score (Kessler et al., 2003). Bogan and Fertig (2018) describe the construction of the indicator:

“The respondent is asked a series of 6 questions about feelings they have had over the past 30 days. They were asked to answer using one of the following choices: all of the time (4), most of the time (3), some of the time (2), a little of the time (1), and none of the time (0). The 6 feelings were: 1) so sad nothing could cheer you up, 2) nervous, 3) restless or fidgety, 4) hopeless, 5) that everything was an effort, and 6) worthless. These question responses are summed to create the K-6 non-specific psychological distress score that ranges between 0 and 24. If a respondent skips one of the questions, the score is set to missing.”

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