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Social Cognition, Personality and Social-Political Correlates of Three Health Behaviors: Application of an Integrated Theoretical Model

A Thesis in partial satisfaction of the requirements for the degree of Master of Arts
in
Psychological Sciences
by
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Abstract

Social Cognition, Personality and Social-Political Correlates of Three Health Behaviors: Application of an Integrated Theoretical Model

by Zoe Marie Griffith for the partial satisfaction of the requirements for the degree of Master of Arts in Psychological Sciences

University of California, Merced 2022
Dr. Martin Hagger, Chair

Background: Dispositional and trait-like constructs, particularly intra-personal personality traits and socio-political beliefs, have been consistently related to health behaviors, but the mechanisms have yet to be fully elucidated. The present study tested the extent to which effects of personality traits (conscientiousness and extroversion) and socio-political beliefs (political beliefs, locus of control, free will beliefs) on health behaviors are mediated by the theory of planned behavior constructs for three health behaviors: physical activity, COVID-19 vaccination, and sugar-sweetened beverage restriction. **Methods:** Proposed model effects were tested in a five-week prospective correlation study for three health behaviors. Finnish residents completed measures of constructs from the proposed model for physical activity (N = 557), COVID-19 vaccination (N = 1,115), and sugar-sweetened beverage restriction (N = 558) and self-reported their behavior at follow-up. **Results**: Single-indicator structural equation modeling revealed a non-zero direct effect of intention on behavior, and non-zero direct effects of social-cognition constructs on intention, across all behaviors. We also found non-zero indirect effects of political beliefs on behavior mediated by social cognition constructs and intentions for the COVID-19 vaccination and sugar-sweetened beverage restriction behaviors, non-zero indirect effects of conscientiousness on behavior mediated by social cognition constructs and intentions for the physical activity and sugar-sweetened beverage restriction behaviors, and non-zero indirect effects of health locus of control on behavior mediated by social cognition constructs and intentions for physical activity behavior. Further, there was a non-zero negative total effect of populist beliefs on behavior in the model for the COVID-19 vaccination behavior. **Conclusion**: The integrated model contributes to an evidence base of generalized intra-personal constructs and social cognition constructs of health behaviors and points to a possible mechanism by which the generalized constructs relate to health behavior.

Keywords: health behavior determinants, social cognition theory, integrated models, political beliefs

Introduction

Adherence to preventive health behaviors is important for minimizing risk of communicable (e.g., COVID-19, HIV-AIDS) and non-communicable (e.g., diabetes, cardiovascular diseases) diseases and conditions. Developing efficacious behavioral interventions to increase uptake of, and adherence to, these behaviors is considered a priority by healthcare providers and health departments. For example, the Centers for Disease Control and Prevention developed and disseminated a tool kit of recommended community interventions to promote COVID-19 vaccination to reduce the spread of COVID-19 (CDC, 2021). Research has suggested that these interventions are likely to be optimally efficacious and efficient if they target change in the modifiable determinants of the behavior of interest and the processes involved (e.g., McEwan et al., 2019; Rothman et al., 2020). Application of theories from behavioral sciences, particularly social psychology, can assist in identifying these determinants and associated processes, and help inform intervention development (Connor & Norman, 2015).

Theories of social cognition have featured prominently in research at identifying health behavior determinants (Connor & Norman, 2015). The theory of planned behavior is a leading theory of this type, and focuses on how individuals' beliefs inform their subsequent decisions to perform a given target behavior in future. According to the theory, intention, a motivational construct representing how much effort an individual will likely invest in pursuing the behavior, is the most proximal correlate of behavior (Ajzen, 1991). Intention is a function of three belief-based constructs: attitude, subjective norms, and perceived behavioral control. Attitudes reflect individuals' appraisals of the utility of the target behavior in producing outcomes. Subjective norms reflect individuals' beliefs that important others approve or disapprove of their participation in the behavior. Perceived behavioral control reflects individuals' beliefs in their capacity to perform the behavior. Effects of these three belief-based constructs on behavior are proposed to be mediated by intention. The theory has been widely applied, and meta-analyses of research applying the theory has found general support for its in predictions, and it accounts for substantive variance in intention and behavior in multiple health behavior (McEachan et al., 2011; Rich et al., 2015).

An important auxiliary prediction of the theory is that its belief-based constructs, serve to summarize the information available to the individual with respect to future performance of the target behavior available (Ajzen, 1991). This information may be derived from multiple sources, such as information from the individuals' environment or context, or even from their own self-knowledge. Consequently, the beliefs are expected to mediate the effects of variables representing environmental and contextual (e.g., socio-structural variables such as age and income) and intra-personal (e.g., dispositions and traits) information on intention to perform, and actual performance of the target behavior. Effects of these variables on intentions and behavior are, therefore, proposed to be indirect, and provide a potential mechanistic explanation, at least in part, for previously observed relations between these variables and health behavior engagement (e.g., Godin et al., 2010; Hagger & Hamilton, 2021). Supporting this premise, research has confirmed that relations between intrapersonal constructs such as personality traits and health behavior are mediated by the belief-based constructs from the theory (e.g., Rhodes & Courneya, 2003; Vo & Bogg, 2015).

In the present study, we aimed to extend this research by examining the extent to which the theory of planned behavior constructs mediate a panel of highly-salient intra-personal constructs on health behavior. Specifically, we aimed to test a proposed model in which effects of personality traits (i.e., conscientiousness and extroversion) and dispositional socio-political beliefs (i.e., political beliefs, locus of control, and free will beliefs) on health behaviors

are mediated by the theory of planned behavior constructs in accordance with the auxiliary prediction of the theory (see also Hagger & Hamilton, 2022; McKinley et al., 2020).

The value of the model test is that it will inform the extent to which these intra-personal variables explain unique variance in health behaviors and, importantly, the theory-based mechanisms involved. Accordingly, we proposed that the intra-personal constructs represent sources of information on which individuals base their beliefs with respect to performing a target behavior in future (i.e., attitudes, subjective norms, and perceived behavior control). The effects of these constructs on health behavior intentions and behavior are, therefore, expected to be mediated by the social cognition constructs in our integrated model. In the current study, we tested these predicted effects in three health behaviors: physical activity, COVID-19 vaccination, and restriction of sugar-sweetened beverage (SSB) consumption.

A Proposed Integrated Model

The intra-personal constructs included in our proposed model have been previously identified as correlates of health behavior. For example, certain personality traits, locus of control, and political orientation have all been linked to participation in a variety of health behaviors (Chatzisarantis & Hagger, 2008; Kannan & Veazie, 2018; Norman et al., 1998). However, relatively few studies have explored *how* these constructs relate to health behavior within the context of social cognition theories. We proposed that the effects of these additional intra-personal constructs would be mediated by the belief-based constructs from the theory of planned behavior based on their informational function, consistent with Ajzen's (1991) predictions. In addition, we also expected the model to apply across multiple behaviors, although we expected that the relevance of the intra-personal constructs, and therefore their indirect effects on behavior mediated by the social cognition constructs, would vary by behavior. We proposed to test these predictions by applying the model in multiple health behaviors. Next, we outline the conceptual basis of our proposed integrated model. Specifically, we outline the rationale for the inclusion of each intra-individual factor, and the proposed process by which they relate to intentions and behavior.

Political Beliefs

Political beliefs, an often-overlooked construct in research examining health behavior determinants, has emerged as an important socio-structural predictor of health behavior. Political beliefs is a broad term that encompasses multiple belief-based constructs including political orientation, populist attitudes, and trust in government. Political orientation is typically operationalized as a person's self-identified position on scales ranging from political left (i.e., 'liberal') to right (i.e., 'conservative') (Carney et al., 2008; Kivikangas et al., 2021; Van Hiel et al., 2021), and has been linked to various health behaviors (e.g., Kannan & Veazie, 2018; Subramanian & Perkins, 2010; Hagger & Hamilton, 2022).

By contrast, populist attitudes are characterized by beliefs that society is divided into two opposing groups, the ordinary 'pure' citizen versus the 'corrupt elite', and by the belief that politics should reflect the general will of the citizens (Muddle, 2004). Populist attitudes have been identified on both the left and right poles of the political orientation spectrum, and are considered to be related to, but conceptually distinct from, political orientation (Muddle, 2004). Populist beliefs have also been shown to be associated with health behaviors, particularly those that are perceived to be linked to government or leadership figures with a particular political agenda. For example, research has indicated that populist attitudes are linked to vaccine hesitancy, distrust of vaccinations, and lower participation in vaccination uptake in the context of the COVID-19 pandemic (Kennedy, 2019; Stecula & Pickup, 2021; Zuk & Zuk, 2019).

The extent to which individuals cite trust in government or 'political elites' has also been identified as a likely correlate of individuals' decisions to engage in, or desist from, health behaviors. This is particularly likely to be the case in contexts where the health behavior is strongly endorsed by the government, through health messaging or funding, or if the behavior is perceived to be linked to strong governmental control or even overreach. For example, trust in

government and its agencies has been shown to predict COVID-19 vaccination intentions (Van Oost et al., 2022), and in-depth interview studies have found that distrust of government health care systems contribute to vaccine hesitancy (Morales et al., 2022). Similarly, trust in government is associated with support for legislation aimed at influencing health behaviors such as introducing a tax on SSBs to reduce obesity (Eykelenboom et al., 2019), or laws to curb tobacco smoking (Lindstrom, 2009). Individuals who express trust in government may be more likely to endorse or participate in health behaviors, particularly those promoted by government. Trust in government as a facet of political beliefs is, therefore, a further potentially important predictor of health behaviors that tend to be endorsed by government agencies. Together, these socio-political beliefs are proposed as key correlates of health behavior in our integrated model, with effects of these beliefs on health behavior expected to be mediated by social cognition constructs and intentions.

Personality Traits

Beyond socio-political beliefs, other dispositional constructs such as the conscientiousness and extroversion personality traits have been shown to be associated with health behaviors (Allen et al., 2016; Rhodes & Smith, 2006). In the context of social cognition theories, such traits are conceptualized as indirect correlates of behavior mediated by the belief-based constructs from these theories (e.g., attitudes, norms, perceived behavioral control) (Ajzen, 1991; Conner & Abraham, 2001). However, they may also predict behaviors directly. The conceptual basis for the mediated effects is based on the informational function of these traits, that is, they serve as an intra-personal 'bias' that influences individuals' estimates of their beliefs with respect to performing the target behavior in future. By contrast, the direct effects may reflect more spontaneous, non-conscious engagement in the behavior independent of individuals' beliefs. This has been corroborated in research incorporating these constructs in tests of these theories. For example, inclusion of personality traits, particularly extroversion and conscientiousness, in tests of the theory of planned behavior has revealed both direct and indirect effects of these traits on exercise behavior (Chatzisarantis & Hagger, 2008; Rhodes & Courneya, 2003). Personality traits are therefore considered an indirect predictor of health behavior, mediated by social cognition constructs, in our proposed integrated model.

Control Perceptions

Perceptions of control, such as free will beliefs and internal locus of control, are also constructs that have been associated with health behavior participation. Free will beliefs reflect a belief in responsible autonomy and freedom of conscious, uncoerced choice (Baumeister & Monroe, 2014). Such beliefs have been associated with higher self-efficacy and setting goals to achieve personally-relevant outcomes. For example, a study in which participants' free-will beliefs were experimentally induced set more meaningful and personally-relevant goals than participants whose free will beliefs were undermined (Crescioni et al., 2016). This is because individuals endorsing free will beliefs are more likely to view that they have agency and capacity to fulfil their goals, and may feel less constrained than individuals who do not endorse those beliefs. Consistent with these findings, research has demonstrated that free will beliefs were associated with COVID-19 booster vaccine intentions (Hagger & Hamilton, 2022).

Another individual difference construct that has been identified as a correlate of health behavior is an *internal* locus of control. Originating from social learning theory, internal locus of control is a generalized orientation that reflects individuals' beliefs that their personal actions will result in expected, desirable outcomes (Rotter, 1966). Individuals are more likely to engage in behaviors when they expect their behavior will be positively reinforced through feedback indicating that they are moving closer to attaining desired outcomes (Rotter, 1966). Individuals who rate their locus of control for health highly, therefore, are expected to be more likely to believe their participation in health behaviors plays an integral role in their health outcomes. Prior

research has found that individuals high in internal locus of control for health were more likely to engage in health-promoting behaviors such as exercise, seasonal flu vaccination, eating a healthy diet and avoiding smoking and alcohol consumption (e.g., Norman et al., 1998; Weiss & Larsen, 1990). Consistent with the aforementioned research outlining the role that individual differences serve as indirect correlates of health behavior mediated by social cognition constructs, research has indicated that locus of control is associated with health intentions and behavior mediated by social cognition beliefs (Armitage et al., 2002; Hagger & Armitage, 2004). Consistent with this evidence, we expected a similar role and pattern of effects for these constructs in our proposed integrated model.

The Present Study

The current integrated social cognition model incorporated multiple intra-personal personality and dispositional factors (e.g., political beliefs, locus of control, personality, free will beliefs) as correlates of health behavior alongside social cognition constructs from the theory of planned behavior (e.g., attitudes, subjective norms, perceived behavioral control). The model outlines how these intra-personal factors serve as indirect correlates of behavior mediated by the social cognition beliefs implicated in decision to engage in health behavior. This is predicated on the basis that these factors serve an informational function that shape or inform individuals' beliefs with respect to performing the behavior in future. Nevertheless, we also expected direct effects which reflect processes that are independent of the reasoned, deliberative processes that precede action represented by the social cognition constructs. We tested the model in a five-week prospective study of Finnish residents in which we measured these constructs at an initial time point with a follow-up measure of behavior taken five-weeks later for three health behaviors: COVID-19 vaccination, physical activity, and restriction of sweetened beverage consumption.

While we predicted that the model reflected generalized decision-making processes and, therefore, the pattern of effects among the constructs will hold across behaviors, we also expected the size or relative contribution of the individual difference factors to vary by behavior. Applying the model to multiple behaviors enabled us to compare which dispositional factors have the largest direct and indirect effects on intentions and behavior. For example, we expected socio-political dispositional factors to exhibit larger effects on COVID-19 vaccination and restriction of SSB consumption intentions and behavior relative to physical activity. These expectations are based on evidence that these behaviors tend to be strongly advocated by governmental agencies and are also perceived as representative of excessive governmental control and overreach (e.g., Eykelenboom et al., 2019; Gratz et al., 2021; Gollust et al., 2014; Stecula & Pickup, 2021). As a consequence, they are more likely to be more salient when it comes to individuals' decisions to act on these behaviors.

The value of identifying the determinates of health behavior using the integrated model is that it further contributes to the evidence base of generalized intra-personal factors and social cognition correlates of health behaviors, particularly by considering potential mechanisms by which the intra-personal factors relate to behavior. It may also inform the development of optimally efficacious and efficient interventions to promote behavior uptake by identifying potentially modifiable targets. Specifically, we aimed to test the following hypotheses:

H1: We expected intra-personal dispositional constructs (e.g., political orientation, trust in government, populist beliefs, locus of control, free will beliefs, conscientiousness, and extroversion) would be related to social cognition beliefs (e.g., attitudes, subjective norms, perceived behavioral control) with respect to the target health behaviors (COVID-19 vaccine uptake, physical activity participation, restriction of sweetened beverages).

H2: We expected social cognition beliefs (e.g., attitudes, subjective norms, perceived behavioral control) would be related to health behavior intentions for each target health behavior

(COVID-19 vaccine uptake, physical activity participation, restricting consumption of sweetened beverages).

H4: We expected behavioral intentions with respect to the target health behavior would predict health behavior at follow-up.

H3: We expected the relationship between dispositional constructs and intention toward, and actual participation in, health behaviors (e.g., COVID-19 vaccination, physical activity, restriction of sweetened beverages) would be mediated by the social cognition variables (e.g., attitudes, social norms, perceived behavioral control).

Method

Participants and Recruitment

Three samples of Finnish residents were recruited via an online research panel company (taloustutkimus.fi) and completed two surveys separated by a five weeks interval comprising study measures for physical activity (N = 557; M age = 48.56, SD = 17.15; 57.63% female), COVID-19 vaccination (N = 1,115; M age = 48.14, SD = 17.16; 57.85% female), and restriction of SSB consumption (N = 558; M age = 47.72, SD = 17.16; 58.06% female) behaviors. To be eligible for inclusion, members of the research panel were required to be aged 18 or older and agree to provide informed consent to participate in the study prior to completing the study measures. Participants were prompted to report their demographic characteristics: age, gender, education, and ethnicity. Sample characteristics for baseline and follow-up for each behavior are provided in Appendix A (supplemental materials).

Design and Procedure

The study adopted a prospective correlational design. Participants were invited to participate in the study by a panel company and were informed that the survey focused on their views and beliefs on health behaviors. On the first data collection occasion (T1), participants completed online self-report measures of personality traits, social-political beliefs, social cognitions, and intentions for physical activity, COVID-19 vaccination, or restriction of SSB consumption were administered. Five weeks after the first data collection occasion (T2) participants self-reported their physical activity, COVID-19 vaccination, and restriction of SSB consumption behavior. Approval for the study was granted prior to data collection by University of [UNIVERSITY NAME MASKED FOR PEER REVIEW] ethics committee.

Measures

Study measures were administered to participants using the *Qualtrics* online survey tool. Descriptions of study measures and their origin and development are described next, with example items for each for the physical activity target behavior provided. Complete study measures for each target behaviors are provided in Appendix B (supplemental materials).

Demographic Variables. Participants self-reported their age, gender, employment status (currently unemployed, part-time/casual employed, currently employed full-time, retired, student), marital status (married, unmarried, in a relationship, cohabitating, widowed), annual household income, and highest level of education (primary school, vocational school, high school, undergraduate degree, master's degree, doctoral degree). Demographic variables were used to describe the sample and were included as covariates in our model tests.

Social Cognition Constructs. Measures of attitudes, subjective norms, perceived behavioral control and intention for physical activity, COVID-19 vaccination, and restriction of SSB consumption were developed according to Ajzen's (2002) guidelines. Attitude was measured using three semantic differential items in response to a common stem referring to the relevant target behavior (i.e., physical activity, COVID-19 vaccination, restriction of SSB consumption): "Doing moderate-to vigorous physical activity at least three times a week for the next four weeks is…". Participants were then presented with a series of bi-polar adjectives and responded on 7-

point scales accordingly (e.g., 1 = *unpleasant* and 7 = *pleasant*). Subjective norm was measured using 3 items (e.g., "Most people who are important to me think I should do at least 150 minutes of moderate-to-vigorous physical activities per week over the next 5 weeks") with responses provided on 7-point scales (1 = *strongly disagree* and 7 = *strongly agree*). Perceived behavioral control was measured using 2 items (e.g., "How much control do you have over doing at least 150 minutes of moderate-to-vigorous physical activity per week over the next 5 weeks?") with responses provided on 7-point scales (1 = *very little control* and 7 = *complete control*). Intention was measured on two items (e.g., "I intend to do at least 150 minutes of moderate-to-vigorous physical activity per week over the next 5 weeks") with responses provided on 7-point scales (1 = *strongly disagree* and 7 = *strongly agree*).

Intra-personal Dispositional Constructs. Internal locus of control was measured using the 4-item Multidimensional Health Locus of Control Scale (Wallston et al., 1978; e.g., "I am in control of my health") with responses provided on 7-point scales (1 = *strongly disagree* and 7 = *strongly agree*). Free will beliefs were measured using five items (e.g., "People always have free will") from The Free Will Inventory (Nadelhoffer et al., 2014) with responses provided on 7-point scales (1 = *strongly disagree* and 7 = *strongly agree*). The conscientiousness (e.g., "Please indicate the extent to which a pair of words applies to you…dependable, self-disciplined") and extroversion (e.g., "Please indicate the extent to which a pair of words applies to you…extraverted, enthusiastic") personality dimensions were measured using two item scales from the Ten Item Personality Inventory (TIPI) with responses provided on 7-point scales (1 = *disagree strongly* and 7 = *agree strongly*). Trust in government was measured using seven items (e.g., "The government is capable") based on Grimmelikhuijen and Kines' (2017) measure with responses provided on a 7-point scale (1 = *strongly disagree* and 7 = *strongly agree*). Populist attitudes was measured using four items (e.g., Elected officials talk too much and take too little action) based on a measure developed by Akkerman et al. (2014) with responses provided on 7-point scales (1 = *strongly disagree* and 7 = *strongly agree*). Political orientation ("How would you describe your political orientation?") was measured on a single item derived from similar measures (e.g., Napier & Jost, 2008; Schlenker, 2012) with responses provided on 7-point scales (1 = *strong liberal* and 7 = *strong conservative*).

Behavior. We used a three item scale to measure physical activity behavior (e.g., "In the past five weeks, to what extent did you do at least 150 minutes of moderate-to-vigorous physical activity each week?") and restriction of SSB consumption (e.g., "In the past five weeks, to what extent did you restrict your daily intake of sugar-sweetened beverages each week?"), based on previously-validated self-report behavioral measures (Amireault & Godin, 2015; Godin, 2011) with responses provided on 7-point scales (1 = *a small extent*; 7 = *a large extent*). COVID-19 vaccination behavior was measured using a single item (e.g., "Have you received at least one dose of the vaccine against coronavirus?") with a dichotomous response scale (1 = *No*, 2 = *Yes*).

Data Analysis

Preliminary analyses. Prior to model testing, manifest variable scores for each of the study constructs and behavior measures were computed by taking the average score of the scale items used to indicate each measure and descriptive sample statistics generated for each variable or construct, and matrices of zero-order correlations among them produced, for each behavior in the full sample. We also computed Omega (ω) reliability statistics for the intra-personal and social cognition constructs (McNeish, 2018).

Model testing. Hypothesized relations among constructs in the proposed model were tested separately for each behavior using single-indicator structural equation modeling (SISEM) implemented in the lavaan package in R (Rosseel, 2012). The SISEM approach was selected over a full latent variable model due to the relative complexity and large parameterization of the proposed model. The single-indicator approach is well-suited for testing complex models in

relatively small sample sizes as it reduces parameterization but still produces parameter estimates comparable to full indicator latent models (Savalei, 2019). Consistent with SISEM guidelines, we used Omega scale reliability coefficients to estimate the measurement error of each variable in the model. Proposed relations between the social cognition constructs (attitude, subjective norm, perceived behavioral control), behavioral intentions (e.g., physical activity, COVID-19 vaccination, restriction of SSB consumption), the intra-personal constructs (extroversion, conscientiousness, political orientation, health locus of control, free will beliefs, trust in government, populist beliefs) and social cognition constructs were set as free parameters. Demographic characteristics (e.g., age, sex, education, employment, ethnicity) were included as covariates in the model. We employed multiple goodness-of-fit indices to evaluate model fit including: the model chi-square value (χ^2), comparative fit index (CFI), root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR). A non-significant χ^2 value ($p > .05$), a CFI value exceeding .90, and RMSEA and SMSR values approaching or below .05 and .08, respectively, indicate good fit model of the model with the data.

Sample size justification. We conducted a statistical power analysis using MacCallum, Browne, and Sugawara's (1996) method based on the RMSEA, implemented using the WebPower function in R (Zhang & Yuan, 2018). We specified our model effect size estimate based on the final RMSEA fit index of .054 from a similar SISEM model with the same number of latent variables ($n = 10$), which was compared to the null hypothesis RMSEA (Hagger & Hamilton, 2022). The degrees of freedom estimate ($n = 75$) used for the analysis was based on the expected number of free parameters in the proposed model. Statistical power was set at .90 and the alpha level set at .05. The analysis returned an expected sample size of 143 participants.

Results

Sample Size and Attrition Analyses

Attrition across the two data collection occasions resulted in final sample sizes of 399 (*M* age = 51.77, *SD* = 16.65; 54.4% female; attrition rate = 28.37%) for the physical activity analysis, 399 (*M* age = 51.77, *SD* = 16.65; 54.4% female; attrition rate = 64.22%) COVID-19 vaccination behavior analysis, and 372 (*M* age = 51.45, *SD* = 16.76; 55.9% female; attrition rate = 33.33%) for the restriction of SSB consumption behavior analysis. Sample characteristics at baseline and follow-up for each behavior are presented in Appendix A (supplemental materials). Attrition analyses in the physical activity sample revealed that participants lost to attrition were younger, t (555) = -7.334, $p < .001$, and more likely to be male, χ^2 (1, N = 399) = 5.604, $p = .017$, and less educated, χ^2 (5, N =399) = 13.868, $p = .016$, than participants retained at follow-up. Analyses in the COVID-19 vaccination sample revealed that participants lost to attrition were younger, t (1113) = -5.337, $p < .001$, and less educated, χ^2 (5, N =399) = 17.017, $p = .004$, than those remaining at follow-up. Analyses for the restriction of SSB behavior revealed that participants lost to attrition were younger, t (556) = -7.636, $p < .001$, and less likely to be married than participants retained at follow up, χ^2 (4, N =372) = 15.837, $p = .003$. No other differences in demographic variables were found in each sample. MANOVAs with the social cognition constructs and behavior measures as multiple dependent variables and attrition status as the independent predictor revealed no statistically significant main effect of attrition in the samples for the physical activity (Wilks' $\Lambda = 0.984$, F (5,551) = 1.790, $p = .112$), COVID-19 vaccination (Wilks' $\Lambda = 0.997$, F (5,1109) = 0.600, $p = .663$), and restriction of SSB consumption (Wilks' $\Lambda = 0.988$, F (5,1109) = 1.300, $p = .265$) behaviors. These analyses indicated no overall differences in these variables between those that remained in the study and those lost to follow up.

Preliminary Analyses

Intercorrelations for the study variables for each model are presented in Appendices D, E, and F of the supplemental materials. Scale reliability coefficients exceeded the expected cut-off criterion ($\omega > .700$) for all study constructs with the exception of the perceived behavioral control for COVID-19 vaccination ($\omega = .405$) and conscientiousness ($\omega = .442$) variables. The below-acceptable threshold of the coefficients for these constructs means that any reported effects involving these variables in our SISEM analysis is likely to be associated with increased measurement error, so findings involving these constructs should be interpreted with this caveat in mind. Full results of the scale reliability analyses are reported in Appendix C (supplemental materials). Zero-order correlations among the study constructs and variables indicated statistically significant, positive correlations among the social cognition constructs and behavior in the physical activity (*r* range = .160 to .651, *ps* < .001), COVID-19 vaccine (*r* range = .269 to .837, *ps* < .001), and restriction of SSB consumption (*r* range = .160 to .604, *ps* < .001) analyses. The only exception was the correlation between the subjective norms and perceived behavioral control construct in restriction of SSB consumption behavior analysis, which was not statistically significant.

Model Effects

Our proposed model exhibited adequate fit with the data for the physical activity (χ^2 = 165.929, $p < .001$; CFI = .951; SRMR = .046; RMSEA = .048, CI [.038, .057]), COVID-19 vaccination (χ^2 = 273.870, $p < .001$; CFI = .950; SRMR = .043; RMSEA = .052, CI [.046, .059]), and restriction of SSB consumption (χ^2 = 216.590, $p < .001$; CFI = .898; SRMR = .049; RMSEA = .057, CI [.048, .066]) analyses. Standardized parameter estimates and 95% confidence intervals for each effect in the single-indicator structural equation models for physical activity, COVID-19 vaccination, and SSB consumption are presented in Table 1.

Direct effects on intention and behavior. We found a non-zero direct effect of intention on behavior for the models for the physical activity (β = .459, CI95 [.268, .650], $p < .001$), COVID-19 vaccination (β = .771, CI95 [.565, .977], $p < .001$), and restriction of SSB consumption (β = .642, CI95 [.563, .721], $p < .001$) behaviors. In addition, we found non-zero direct effect of perceived behavioral control on behavior (β = .313, CI95 [.096, .530], $p = .005$) in the model for physical activity behavior, and a negative direct effect of populist beliefs on behavior (β = -0.135, CI95 [-0.242, -0.028], $p = .014$) in the model for COVID-19 vaccination behavior. We also found non-zero direct effects of attitudes (physical activity behavior, β = .267, CI95 [.138, .395], $p < .001$; COVID-19 vaccination behavior, β = .712, CI95 [.629, .724], $p < .001$; restriction of SSB consumption behavior, β = .349, CI95 [.246, .452], $p < .001$), social norms (physical activity behavior, β = .174, CI95 [.097, .252], $p < .001$; COVID-19 vaccination behavior, β = .120, CI95 [.069, .172], $p < .001$; restriction of SSB consumption behavior, β = .423, CI95 [.334, .511], $p < .001$), and perceived behavioral control (physical activity behavior, β = .576, CI95 [.457, .696], $p < .001$; COVID-19 vaccination behavior, β = .164, CI95 [.053, .275], $p = .004$; restriction of SSB consumption behavior, β = .181, CI95 [.069, .293], $p = .002$), on intention.

Direct effects on social cognition constructs. There was a non-zero direct effect of health locus of control on attitudes (β = .217, CI95 [.097, .338], $p < .001$) in the model for physical activity. Both trust in government (β = .0261, CI95 [.165, .357], $p < .001$) and populist beliefs (β = -0.122, CI95 [-0.200, -0.045], $p = .002$) had non-zero direct effects on attitudes in the model for COVID-19 vaccination behavior. We also found a non-zero positive direct effect of conscientiousness on attitudes in the model for the restriction of SSB consumption behavior (β = .272, CI95 [.107, .437], $p < .001$), and non-zero negative direct effects of conscientiousness on subjective norms in the models for physical activity (β = -.174, CI95 [-.340, -.009], $p = .039$ and restriction of SSB consumption (β = -.184, CI95 [-.356, -.012], $p = .036$) behaviors. There were non-zero direct effects of political orientation on subjective norms (β = .191, CI95 [.018, .365], *p*

= .031) for model for SSM consumption, and for trust in government on subjective norms for the models for SSM consumption (β = .252, CI95 [.105, .399], p <.001) and the COVID-19 vaccination (β = .169, CI95 [.055, .282], p = .004) behaviors. We also found non-zero direct effects of conscientiousness on perceived behavioral control in the models for physical activity (β = .228, CI95 [.076, .379], p = .003) and restriction of SSB consumption (β = .228, CI95 [.046, .409], p = .014) behaviors. Further, we found a non-zero direct effect of health locus of control on perceived behavioral control in the model for physical activity (β = .194, CI95 [.070, .319], p = .002). We found a non-zero negative direct effect of populist beliefs on perceived behavioral control in the models for COVID-19 vaccination (β = -.177, CI95 [-.293, -.061], p = .003) and restriction of SSB consumption (β = -.148, CI95 [-.284, -.013], p = .032) behaviors. In addition, there was a non-zero direct effect of trust in government on perceived behavioral control in the model for COVID-19 vaccination (β = .245, CI95 [.106, .384], p < .001).

Indirect effects on intention. We found non-zero indirect effects of health locus of control on intention mediated by attitudes (β = .058, CI95 [.015, .100], p = .007) and perceived behavioral control (β = .112, CI95 [.037, .187], p = .004), respectively, in the model for physical activity behavior. We also found non-zero indirect effects of trust in government (β = .186, CI95 [.114, .258], p < .001) and populist beliefs (β = -.087, CI95 [-.143, -.031], p = .002) on intentions mediated by attitudes in the model for COVID-19 vaccination behavior. There was a non-zero negative indirect effect of populist beliefs on intention mediated by perceived behavioral control (β = -.029, CI95 [-.054, -.005], p = .020) in the model for COVID-19 vaccination behavior. We found a non-zero indirect effects of trust in government (β = .107, CI95 [.040, .173], p = .002) and populist beliefs (β = .068, CI95 [.012, .124], p = .017) on intentions mediated by subjective norms in the model for restriction of SSB consumption.

Indirect effects on behavior. We found a non-zero indirect effect of conscientiousness on behavior mediated by attitudes and intention (β = .061, CI95 [.019, .103], p = .004) in the model for restriction of SSB consumption. There was a non-zero indirect effect of conscientiousness on behavior mediated by perceived behavioral control and intention (β = .60, CI95 [.013, .108], p = .013) in the model for physical activity. There was a non-zero indirect effect of health locus of control on behavior mediated by attitudes and intention (β = .027, CI95 [.003, .050], p = .028) in the model for physical activity. In addition, there was a non-zero indirect effect of health locus of control on behavior mediated by perceived behavioral control and intention (β = .051, CI95 [.012, .091], p = .011) in the model for physical activity. In addition, we found non-zero indirect effects of trust in government on behavior mediated by subjective norms and intentions in the models for COVID-19 vaccination (β = .016, CI95 [.003, .029], p = .017) and restriction of SSB consumption (β = .068, CI95 [.025, .112], p = .002) behaviors. There was a non-zero indirect effect of trust in government on behavior mediated by attitudes and intentions in the model for COVID-19 vaccination (β = .143, CI95 [.077, .209], p < .001), and mediated by perceived behavioral control and intentions (β = .031, CI95 [.002, .060], p = .034). There was a non-zero positive indirect effect of populist beliefs on behavior mediated by subjective norms and intentions in the model for restriction of SSB consumption behavior(β = .044, CI95 [.007, .080], p = .019), and non-zero negative indirect effects of populist beliefs on behavior mediated by attitudes and intentions (β = -0.067, CI95 [-0.113, -0.021], p = .004) and by perceived behavioral control and intention (β = -0.022, CI95 [-0.043, -0.002], p = .034) in the model for COVID-19 vaccination behavior. There was a non-zero positive indirect effect of political orientation on restriction of SSB consumption behavior (β = .052, CI95 [0.003, 0.101], p = .039) mediated by subjective norms and intention in the model for restriction of SSB consumption behavior. Finally, we found a non-zero negative total effect of populist beliefs on behavior in the model for COVID-19 vaccination behavior (β = -0.231, CI95 [-0.357, -0.104], p < .001).

Discussion

The present study tested an integrated theoretical model specifying relations among social cognition constructs from the theory of planned behavior, a set of intra-personal personality and socio-political factors, and intentions toward and actual participation in, health behavior in a sample of Finland residents for three health behaviors: physical activity, COVID-19 vaccination and restriction of SSB consumption. Importantly, the model specified that the effects of intra-personal dispositional constructs and behavior would be mediated by belief-based constructs from the theory of planned behavior and intention. In terms of theoretical mechanisms, we proposed that the intra-personal constructs would serve as sources of information for individuals' beliefs with respect to their future performance of the health behavior (see Ajzen, 1991, 2020), and, therefore, play an explanatory role, at least in part, for the observed relations between these constructs and the behaviors.

Our analysis identified a number of common patterns of effect in the models for the three behaviors. Consistent with the theory of planned behavior, we observed consistent effects of intentions on behavior with medium effect sizes, and the belief-based social cognition constructs from the theory were related to intention with small-to-medium effect sizes. By contrast, we observed behavior-specific patterns of indirect effects of the personality and socio-political variables on intentions and behavior mediated by the social cognition constructs. This means that while the generalized model held in all three samples insofar as we found one or more indirect effects of the dispositional and socio-structural constructs on behavior mediated by the social cognition constructs in each case, the observed patterns varied by behavior in terms of the intra-personal constructs and the social cognition mediator These effects provide useful insight into some of the key constructs that likely inform individuals' intention toward, and actual participation in, these health behaviors and, importantly, the salient mediators that may inform on the potential mechanism involved.

Effects of Political Beliefs

A prominent finding in the current analysis was the positive relations between trust in government with intention and behavior for COVID-19 vaccination and restriction of SSB consumption behaviors, which were mediated by subjective norms, consistent with the generalized predictions of our model. These findings conform with expectations considering the socio-political salience of government-sponsored COVID-19 vaccination initiatives and SSB taxes. Our findings suggest that political beliefs serve as a source of information when individuals make decisions on whether or not to get a COVID-19 vaccination and restricting consumption of SSBs. Focusing on COVID-19 vaccination behavior, studies suggest that this behavior is linked to individuals' political and social beliefs – those that tend to endorse populist beliefs are less likely to get vaccinated (Kennedy, 2019; Zuk & Zuk, 2020). Analogously, research has demonstrated that higher levels of trust in government is associated with COVID-19 vaccination intentions (Van Oost et al., 2022). Our results corroborate and extend these findings, suggesting that individuals in the current study likely draw from these generalized beliefs when making decisions to get vaccinated, particularly their attitudes such that these generalized beliefs inform the sets of specific beliefs that line up future behavior, consistent with social cognition theories like the theory of planned behavior (Ajzen, 1991).

By contrast, prior evidence linking political and social beliefs with SSB consumption is relatively sparse. There is some research indicating that individuals' perceived SSB taxation as a potential solution to obesity (Eykelenboom et al., 2019), but it is unclear how such beliefs relate to their SSB consumption behavior. Individuals from the current sample may have been aware of legislation surrounding SSB consumption, given the high profile of an excise tax on high-sugar

products including SSBs in Finland that was repealed (Library of Congress, 2015). Assuming participants were aware of the governmental intervention to restrict SSB intake, our findings suggest that such knowledge informed their decisions to restrict their SSB consumption.

While we found a positive indirect effect of political orientation and populist beliefs on SSB restriction in the current sample, we might have expected these effects to be negative in a US sample. This is because individuals endorsing conservative political beliefs in the US tend to be less supportive of government policies, such as those aimed at restricting SSB consumption, than those endorsing liberal beliefs (Gollust et al., 2014). However, the populist movement in Finland, the Finns Party, has been described as economically left-wing but socially right-wing (Yle Uutiset, 2015), which may account for the potential differences in the sign of expected effects. However, we stress that this explanation is speculative – we did not collect data on party affiliation or taxation attitudes, nor did we test the model in a US sample for comparsion. We cannot, therefore, make an unequivocal judgment on the veracity of this explanation without further data.

Our findings emphasize the value of distinguishing between multiple facets of political beliefs (e.g., trust in government, populist attitudes) rather than using generalized political beliefs measure (e.g., political orientation). Political orientation explained relatively little variance in these health behaviors while we found multiple effects for trust in government and populist attitudes on behavior in the models for two of the three behaviors. The observed convergence in effects for the latter facets of political beliefs might be because both constructs summarize attitudes toward political elites. Specifically, the anti-elitism aspect of populism could manifest as skepticism and distrust of scientists and experts endorsed by the government (Oliver & Rahn, 2016). This presented in the current study as a non-zero negative correlation between these factors, and the similar pattern of effects for the two behaviors with political relevance, COVID-19 vaccination and restriction of SSB consumption. Future research may provide further evidence to corroborate this explanation by considering the role of anti-elitism in predicting engagement in health behaviors that are promoted by government-endorsed experts.

Effects of Personality

A noteworthy finding in the current analysis was the positive indirect effect of conscientiousness on intention and behavior mediated by perceived behavioral control and attitudes in the models on physical activity and restriction of SSB behaviors, respectively, with no direct effects. These findings suggest that conscientiousness serves as basis for individuals' beliefs with respect to performing these behaviors in future. This is consistent with prior research demonstrating that higher levels of conscientiousness are related to beliefs, including positive attitudes and perceived behavioral control, and intentions toward, and actual participation in, health behaviors (Chatzisarantis & Hagger, 2008; Conner & Abraham, 2001; Rhodes & Smith, 2006). Taken together, these findings support predictions offered by social cognition theorists in disposition-belief-motivation models which outline a potential mechanism by which personality traits affect multiple behaviors (Ajzen, 1991; Bogg & Milad, 2020; Hagger et al., 2019). It is important to note that we did not find similar effects for extroversion. While prior research has demonstrated a relationship between extroversion and behaviors for some health behaviors, like physical activity participation (Rhodes & Courneya, 2003), patterns of effects tend to be more consistent for conscientiousness (Allen et al., 2016). It is also important to note that effects of personality traits are not often explored alongside effects of other intra-personal traits such as political beliefs and control perceptions, which may have attenuated the size of effects of the personality traits due to shared variance among them which they also share with intentions and behavior.

Effects of Control Perceptions

We found positive indirect effects of health locus of control on intention and behavior for physical activity behavior, mediated by attitudes and perceived behavioral control, respectively. These findings indicate health locus of control informs individuals' beliefs with respect to the perceived utility and their perceived capacity with respect to future physical activity participation, and ultimately informs their motivation and behavior. These findings corroborate and extend prior research indicating that an internal locus of control is positively related to physical activity intentions mediated by attitudes (Hagger & Armitage, 2004). These findings indicate that generalized control perceptions are highly relevant for physical activity decisions and enactment, a pattern consistent with participation in physical activity as a planned health behavior with highly individual outcomes. This contrasts with behaviors like COVID-19 vaccination and restriction of SSB consumption, which may be more dependent on socio-political and other-oriented dispositions. Contrary to expectations, we did not find direct or indirect effects of free will beliefs on behavior in the three samples. This contrasts with research that found indirect effects of free will beliefs intentions to receive the COVID-19 vaccine booster through social cognition constructs (Hagger & Hamilton, 2022). However, these findings were in a US sample, and these beliefs may be more salient in making decisions about COVID-19 vaccination in this context, particularly in light of the highly politicized environment in which vaccines have been developed and distributed in the US.

Implications for Intervention

The current findings contribute to an evidence base of potential targets for interventions aimed at promoting change in these behaviors. This is predicated on the assumption that behavior change techniques used in interventions lead to behavior change by targeting change in potentially modifiable determinants of the behavior of interest, known as mechanisms of action (Sheeran et al., 2017). An implication of the current analysis is the identification of populations whose dispositional orientations may make them vulnerable to refraining from participating in health behaviors, such as those holding populist beliefs or citing low trust in government, or more likely to participate in these behaviors, such as those scoring high on conscientiousness. The value of the current research is that it also highlights that such dispositions affect individuals' immediate beliefs that line up their future behavior. As a consequence, these findings point to multiple potential targets for behavior change through change in the dispositional constructs and change the social cognition beliefs. Although there is research suggesting that dispositional constructs like personality are subject to change (Roberts et al., 2017), such constructs tend to be stable and enduring, and changing such deep-seated constructs may present challenges to interventionists. By contrast, social cognition constructs are likely to be less stable and more subject to change and may therefore be more viable as targets for interventions. For example, interventions that adopt messages and persuasive communications that target the attitudes (e.g., by emphasizing the proximal and salient utility and advantages of the behavior) and perceived behavioral control (e.g., by emphasizing the accessibility and low barriers for performing the behavior) might be influential and negate effects of dispositional constructs such as populist beliefs on the behavior without the need to specifically address or confront the populist beliefs. However, it is important to note that these suggestions for interventions are predicated on the assumption that changes in the social cognition constructs will lead to changes in intentions and behavior, inferences that are based on theory rather than the current data because the current study design did not model change in the constructs and behavior over time.

Strengths, Limitations, and Avenues for Future Research

The current study had numerous strengths: proposal of an integrated theoretical approach to explaining health behaviors drawing from theories of personality and social cognition including politically-oriented constructs that are particularly prescient and timely for behaviors such as COVID-19 vaccination; simultaneous examination of the effects of these intrapersonal

dispositional constructs alongside belief-based constructs on with intentions and behavior for three health behavior in a single model; and adoption of appropriate, validated measures in a prospective design. It is, however, important to highlight some of the limitations of the current research that should be considered when interpreting its findings.

First, our sample was not recruited using random selection or stratification and was limited to residents from a single national group. Therefore, we cannot generalize our findings to a broader population in Finland or further afield. This is important as the observed effects might be specific to the national group with specific social and cultural norms, political system, and contextual patterns of behavior. Future studies should seek to replicate the predictions of the current model in representative samples and in other national groups.

Second, we tested our model using a prospective correlational design which precludes inference of causality in the estimated effects in our model. As with all correlational designs, the causal direction of the effects is based on theory alone, and not the data. Future research should seek to verify and extend the current findings by adopting experimental and true longitudinal, panel designs that enable change to be modelled. Finally, we relied exclusively on self-report measures of behavior, which may be subject to socially desirable responses and recall bias. Future research should still seek to corroborate current findings with non-self-report behavioral measures.

Conclusion

The current research tested the predictions of an integrated model specifying effects of personality traits, dispositional socio-political beliefs, and social cognition constructs on intentions and behavior for three health behaviors: physical activity, COVID-19 vaccination, and restriction of sugar-sweetened beverage (SSB) consumption. Findings support effects of social cognition constructs on intentions and behavior consistent with theory, and behavior-specific patterns of indirect effects of the personality and socio-political beliefs constructs on behavior mediated by the social cognition constructs and behavior. The model test contributes to an evidence base of potential modifiable targets for behavioral interventions for three health behaviors. Targeting these modifiable constructs may offset the deleterious effects of intra-personal dispositions on engagement in specific health behaviors. Findings should be regarded as preliminary and there is a need for future research to corroborate our findings in representative samples and adopting experimental and longitudinal panel designs.

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Table 1

Standardized Parameter Estimates and 95% Confidence Intervals for Each Effect in the Single-Indicator Structural Equation Models Physical Activity, COVID-19 Vaccination, and Sugar-Sweetened Beverage Consumption Behaviors

Effect	Physical activity			COVID-19 vaccination			Sugar-sweetened Beverage Consumption		
	β	95% CI		β	95% CI		β	95% CI	
		LL	UL		LL	UL		LL	UL
Direct effects									
Int→Beh	0.459***	0.268	0.650	0.771***	0.565	0.977	0.642***	0.563	0.721
PBC→Beh	0.313**	0.096	0.530	-0.158	-0.436	0.120	0.022	-0.099	0.143
C→Beh	0.029	-0.104	0.161	-0.048	-0.175	0.079	0.007	-0.153	0.167
E→Beh	0.009	-0.079	0.097	-0.039	-0.127	0.048	-0.010	-0.105	0.085
PO→Beh	0.012	-0.139	0.162	-0.048	-0.188	0.092	0.004	-0.144	0.153
HLOC→Beh	-0.031	-0.134	0.073	-0.046	-0.149	0.056	0.072	-0.053	0.197
FWB→Beh	-0.046	-0.160	0.067	0.043	-0.064	0.150	-0.033	-0.147	0.080
TG→Beh	-0.024	-0.162	0.114	-0.040	-0.171	0.091	-0.056	-0.180	0.069
PB→Beh	0.046	-0.067	0.158	-0.135*	-0.242	-0.028	-0.084	-0.200	0.031
Att→Int	0.267***	0.138	0.395	0.712***	0.629	0.794	0.349***	0.246	0.452
SN→Int	0.174***	0.097	0.252	0.120***	0.069	0.172	0.423***	0.334	0.511
PBC→Int	0.576***	0.457	0.696	0.164**	0.053	0.275	0.181**	0.069	0.293
C→Att	0.099	-0.052	0.250	0.045	-0.056	0.146	0.272***	0.107	0.437
E→Att	0.097	-0.009	0.204	0.036	-0.032	0.105	0.001	-0.106	0.109
PO→Att	0.039	-0.144	0.222	-0.038	-0.149	0.074	-0.013	-0.180	0.154
HLOC→Att	0.217***	0.097	0.338	-0.019	-0.097	0.060	-0.039	-0.172	0.094
FWB→Att	-0.046	-0.186	0.095	-0.007	-0.089	0.075	-0.034	-0.160	0.092
TG→Att	0.067	-0.100	0.234	0.261***	0.165	0.357	0.041	-0.100	0.183
PB→Att	-0.066	-0.200	0.068	-0.122**	-0.200	-0.045	-0.053	-0.175	0.069
C→SN	-0.174*	-0.340	-0.009	0.028	-0.090	0.146	-0.184*	-0.356	-0.012
E→SN	0.052	-0.065	0.170	-0.038	-0.118	0.043	0.009	-0.102	0.121
PO→SN	0.137	-0.065	0.339	0.014	-0.117	0.144	0.191*	0.018	0.365
HLOC→SN	0.129	-0.005	0.263	-0.022	-0.117	0.073	0.015	-0.124	0.154
FW→SN	0.038	-0.117	0.193	0.013	-0.085	0.112	-0.039	-0.172	0.094
TG→SN	0.029	-0.156	0.214	0.169**	0.055	0.282	0.252**	0.105	0.399
PB→SN	-0.003	-0.151	0.145	-0.071	-0.165	0.023	0.161*	0.034	0.289
C→PBC	0.228**	0.076	0.379	0.160	0.017	0.303	0.228*	0.046	0.409
E→PBC	-0.003	-0.112	0.106	0.036	-0.062	0.135	-0.025	-0.144	0.093
PO→PBC	0.015	-0.172	0.202	-0.042	-0.200	0.117	-0.043	-0.228	0.143
HLOC→PBC	0.194**	0.070	0.319	-0.074	-0.190	0.042	-0.031	-0.178	0.117
FWB→PBC	0.052	-0.093	0.196	0.107	-0.014	0.229	0.066	-0.075	0.208
TG→PBC	0.062	-0.109	0.233	0.245***	0.106	0.384	0.001	-0.157	0.159
PB→PBC	-0.107	-0.244	0.030	-0.177**	-0.293	-0.061	-0.148*	-0.284	-0.013
Indirect effects[a]									
C→Att→Int	0.026	-0.016	0.069	0.032	-0.040	0.104	0.095**	0.031	0.158
C→SN→Int	-0.030	-0.062	0.001	0.003	-0.011	0.018	-0.078*	-0.153	-0.002
C→PBC→Int	0.131**	0.040	0.223	0.026	-0.002	0.055	0.041	0.001	0.082
E→Att→Int	0.026	-0.005	0.057	0.026	-0.023	0.074	0.000	-0.037	0.038
E→SN→Int	0.009	-0.012	0.030	-0.005	-0.014	0.005	0.004	-0.043	0.051
E→PBC→Int	-0.002	-0.065	0.061	0.006	-0.010	0.022	-0.005	-0.026	0.017
PO→Att→Int	0.010	-0.039	0.060	-0.027	-0.106	0.052	-0.005	-0.063	0.054
PO→SN→Int	0.024	-0.013	0.061	0.002	-0.014	0.017	0.081*	0.005	0.157
PO→PBC→Int	0.009	-0.099	0.116	-0.007	-0.033	0.019	-0.008	-0.041	0.026
HLOC→Att→Int	0.058**	0.015	0.100	-0.013	-0.069	0.042	-0.014	-0.060	0.033

HLOC→SN→Int	0.023	-0.003	0.048	-0.003	-0.014	0.009	0.006	-0.052	0.065
HLOC→PBC→Int	0.112**	0.037	0.187	-0.012	-0.034	0.010	-0.006	-0.032	0.021
FWB→Att→Int	-0.012	-0.050	0.026	-0.005	-0.063	0.053	-0.012	-0.056	0.032
FWB→SN→Int	0.007	-0.020	0.034	0.002	-0.010	0.014	-0.016	-0.073	0.040
FWB→PBC→Int	0.030	-0.053	0.113	0.018	-0.004	0.039	0.012	-0.015	0.039
TG→Att→Int	0.018	-0.027	0.063	0.186***	0.114	0.258	0.014	-0.035	0.064
TG→SN→Int	0.005	-0.027	0.037	0.020*	0.004	0.036	0.107**	0.040	0.173
TG→PBC→Int	0.036	-0.063	0.135	0.040*	0.007	0.074	0.000	-0.028	0.029
PB→Att→Int	-0.018	-0.054	0.019	-0.087**	-0.143	-0.031	-0.018	-0.061	0.024
PB→SN→Int	-0.001	-0.026	0.025	-0.009	-0.020	0.003	0.068*	0.012	0.124
PB→PBC→Int	-0.062	-0.142	0.019	-0.029*	-0.054	-0.005	-0.027	-0.056	0.003
C→Att→Int→Beh	0.012	-0.008	0.033	0.025	-0.031	0.081	0.061**	0.019	0.103
C→SN→Int→Beh	-0.014	-0.030	0.002	0.003	-0.008	0.014	-0.050	-0.099	-0.001
C→PBC→Int→Beh	0.060*	0.013	0.108	0.020	-0.003	0.043	0.026	0.000	0.053
E→Att→Int→Beh	0.012	-0.004	0.027	0.020	-0.018	0.058	0.000	-0.024	0.024
E→SN→Int→Beh	0.004	-0.006	0.014	-0.003	-0.011	0.004	0.003	-0.028	0.033
E→PBC→Int→Beh	-0.001	-0.030	0.028	0.005	-0.008	0.017	-0.003	-0.017	0.011
PO→Att→Int→Beh	0.005	-0.018	0.027	-0.021	-0.082	0.041	-0.003	-0.040	0.034
PO→SN→Int→Beh	0.011	-0.007	0.028	0.001	-0.011	0.013	0.052*	0.003	0.101
PO→PBC→Int→Beh	0.004	-0.046	0.053	-0.005	-0.026	0.015	-0.005	-0.027	0.017
HLOC→Att→Int→Beh	0.027*	0.003	0.050	-0.010	-0.054	0.033	-0.009	-0.039	0.021
HLOC→SN→Int→Beh	0.010	-0.002	0.023	-0.002	-0.011	0.007	0.004	-0.034	0.042
HLOC→PBC→In→Beh	0.051*	0.012	0.091	-0.009	-0.027	0.008	-0.004	-0.021	0.014
FWB→Att→Int→Beh	-0.006	-0.023	0.012	-0.004	-0.049	0.041	-0.008	-0.036	0.021
FWB→SN→Int→Beh	0.003	-0.009	0.016	0.001	-0.008	0.010	-0.011	-0.047	0.026
FWB→PBC→Int→Beh	0.014	-0.025	0.052	0.014	-0.004	0.031	0.008	-0.009	0.025
TG→Att→Int→Beh	0.008	-0.013	0.029	0.143***	0.077	0.209	0.009	-0.023	0.041
TG→SN→Int→Beh	0.002	-0.013	0.017	0.016*	0.003	0.029	0.068**	0.025	0.112
TG→PBC→Int→Beh	0.016	-0.029	0.062	0.031*	0.002	0.060	0.000	-0.018	0.018
PB→Att→Int→Beh	-0.008	-0.025	0.009	-0.067**	-0.113	-0.021	-0.012	-0.039	0.016
PB→SN→Int→Beh	0.000	-0.012	0.012	-0.007	-0.016	0.003	0.044*	0.007	0.080
PB→PBC→Int→Beh	-0.028	-0.066	0.010	-0.022*	-0.043	-0.002	-0.017	-0.036	0.002
Sums of indirect effects[b]									
C→SC→Int	0.127*	0.005	0.250	0.062	-0.029	0.153	0.059	-0.056	0.173
E→SC→Int	0.033	-0.054	0.120	0.027	-0.034	0.089	0.000	-0.071	0.071
PO→SC→Int	0.043	-0.106	0.192	-0.032	-0.132	0.068	0.069	-0.043	0.180
HLOC→SC→Int	0.192***	0.094	0.291	-0.028	-0.099	0.043	-0.013	-0.101	0.075
FWB→SC→Int	0.024	-0.090	0.139	0.014	-0.060	0.089	-0.016	-0.101	0.068
TG→SC→Int	0.059	-0.077	0.195	0.246***	0.160	0.333	0.121*	0.026	0.217
PB→SC→Int	-0.080	-0.189	0.029	-0.125**	-0.195	-0.055	0.023	-0.060	0.106
C→SC→Int→Beh	0.058	-0.002	0.119	0.048	-0.024	0.119	0.038	-0.036	0.111
E→SC→Int→Beh	0.015	-0.025	0.056	0.021	-0.027	0.069	0.000	-0.046	0.046
PO→SC→Int→Beh	0.020	-0.049	0.088	-0.025	-0.102	0.053	0.044	-0.028	0.116
HLOC→SC→Int→Beh	0.088**	0.030	0.147	-0.022	-0.077	0.033	-0.008	-0.065	0.048
FWB→SC→Int→Beh	0.011	-0.042	0.064	0.011	-0.046	0.068	-0.011	-0.065	0.044
TG→SC→Int→Beh	0.027	-0.036	0.090	0.190***	0.105	0.275	0.078*	0.015	0.140
PB→SC→Int→Beh	-0.037	-0.089	0.016	-0.096**	-0.156	-0.036	0.015	-0.039	0.068
Total effects[c]									
C→Beh	0.087	-0.060	0.234	0.000	-0.151	0.151	0.045	-0.138	0.228
E→Beh	0.024	-0.070	0.117	-0.019	-0.119	0.082	-0.010	-0.115	0.095
PO→Beh	0.031	-0.129	0.191	-0.073	-0.234	0.089	0.048	-0.118	0.215
HLOC→Beh	0.058	-0.058	0.173	-0.068	-0.186	0.050	0.064	-0.075	0.203
FWB→Beh	-0.035	-0.157	0.087	0.054	-0.069	0.177	-0.044	-0.170	0.082
TG→Beh	0.003	-0.144	0.150	0.150	-0.012	0.312	0.022	-0.116	0.161

PB→Beh	0.009	-0.112	0.130	-0.231***	-0.357	-0.104	-0.070	-0.197	0.058

Note. [a]Indirect effects of each trait and dispositional belief on intentions and behavior through each social cognition construct; [b]Sums of indirect effects of each trait and dispositional belief on intentions and behavior through all social cognition constructs; [c]Total effects of traits and dispositional beliefs on behavior comprising sums of indirect effects through all social cognition constructs and direct effects; [d]Additional covariances among traits and dispositional beliefs identified by modification indices; β = Standardized path coefficient; 95% CI = 96% confidence intervals of the standardized path coefficient; LL = Lower limit of the 95% confidence interval; UL = Upper limit of the 95% confidence interval; Int = Intention; Beh = Behavior; PBC = Perceived behavioral control; C = Conscientiousness personality trait; E = Extroversion personality trait; PO = Political orientation; HLOC = Health locus of control; FWB = Free will beliefs; TG = Trust in government; PB = Populist beliefs; Att = Attitude; SN = Subjective norm; SC = Social cognition constructs (attitude, subjective norms, perceived behavioral control). $^{*}p < .05$ $^{**}p < .01$ $^{***}p<.001$.

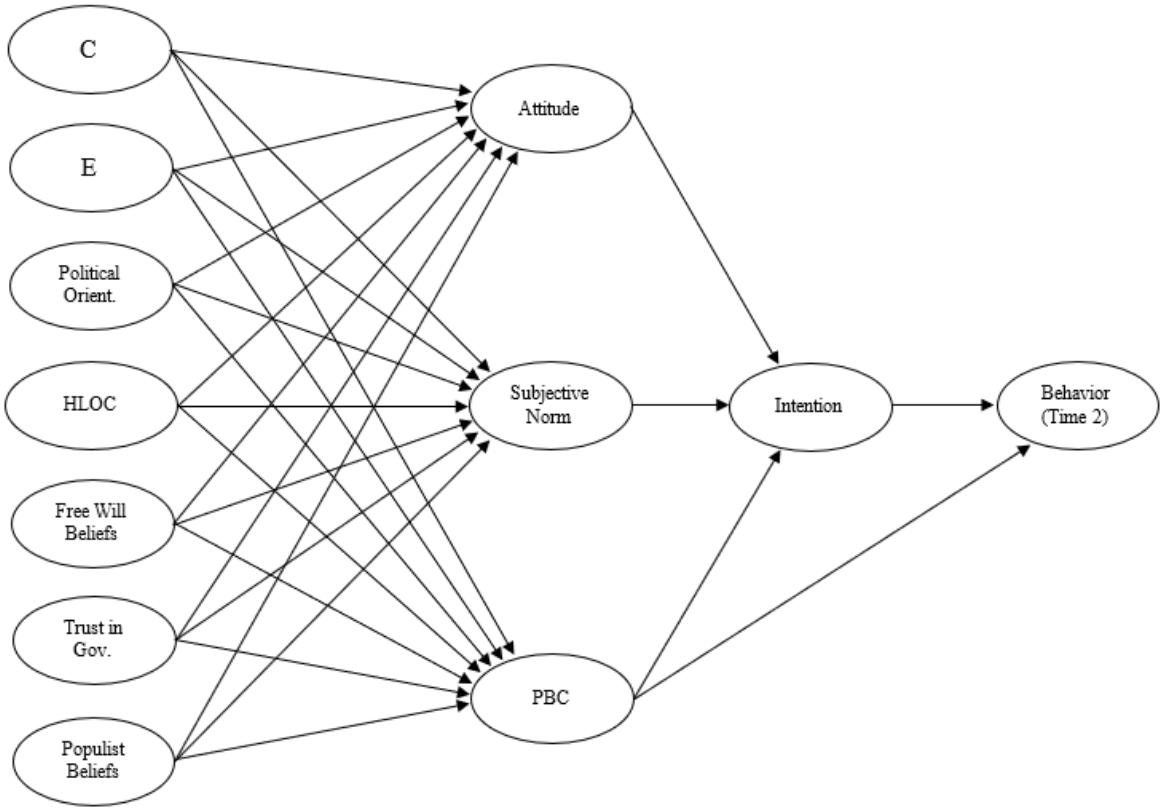

Figure 1

Proposed integrated social cognition model.

Note. Effects of age, sex, income, ethnicity, education, employment, and relationship status as covariates on intention and behavior not illustrated. C = Conscientiousness personality trait; E = Extroversion personality trait; Political Orient. = Political orientation; HLOC = Health locus of control; Trust in Gov. = Trust in government.