HHS Public Access

Author manuscript

Aging Ment Health. Author manuscript; available in PMC 2020 November 01.

Published in final edited form as:

Aging Ment Health. 2020 November ; 24(11): 1935–1944. doi:10.1080/13607863.2019.1667300.

Personality Determinants of Subjective Executive Function in Older Adults

Tyler Bell[1], **Nikki Hill**[1], **Despina Stavrinos**[2,*]

[1]College of Nursing, Pennsylvania State University

[2]Department of Psychology, University of Alabama at Birmingham

Abstract

Objectives: Problems in subjective executive function, the perceived cognitive control of mental processes for goal-directed behavior, may indicate cognitive impairment in older adulthood. Although previous studies highlight the importance of personality on objective cognitive performance, no studies clarify their role with subjective executive function. To inform methods of early identification of cognitive impairment, this study explored how temperament and personality traits account for problems in subjective executive function.

Method: The current project examined the associations between temperament and personality on subjective executive function across two samples of community-dwelling older adults (65+ years, $n_1 = 25$, $n_2 = 50$). Both studies measured subjective executive function (Behavioral Rating Inventory of Executive Function-Adult) and separately administered scales on temperament (Adult Temperament Questionnaire) and personality (Big Five Inventory).

Results: Concerning temperament, older adults higher in negative affect endorsed greater difficulty in subjective executive function. Regarding personality traits, older adults with higher neuroticism and lower conscientiousness reported higher difficulty in subjective executive function.

Conclusion: Findings enhance our understanding of subtle cognitive changes and may aid in early detection. In particular, distressful inclinations were associated with more reported problems in executive function whereas problem-solving tendencies were inversely related. Future work should examine if enhanced negativity coupled with analytical disengagement predicts problems in subjective executive function over time.

Studies on subjective cognition (i.e., self-reports of cognitive performance) focus predominantly on memory problems – reported by a quarter of older adults (Bassett & Folstein, 1993; Jonker et al., 2000; Molinuevo et al., 2017) – and demonstrate that poor subjective cognition is often associated with future cognitive decline (Buckley et al., 2016; Hohman et al., 2011; Reisberg, Shulman, Torossian, Leng, & Zhu, 2010). While some reports of cognitive problems derive from actual errors in cognition, like commonly forgetting words (Benito-Leon, Mitchell, Vega, & Bermejo-Pareja, 2010; Lee, Ong, Pike, &

*Corresponding author: **Physical address:** 916 Building, 916 19th Street South, Birmingham AL, 35294-2100, dstavrin@uab.edu, **Phone:** 205.934.7891, **Fax:** 205.934.2295.

Declaration of interest: Authors have no conflicts of interest to report.

Kinsella, 2018; Snitz, Moorow, Rodriguez, Huber, & Saxton, 2008), many times the cross-sectional relation between subjective and objective cognition is weak or non-existent (Marino et al., 2009; Weaver, Collie, Masters, & Maruff, 2008). A recent meta-analysis confirmed a significant small association between subjective and objective cognitive problems, but great variability across studies were found (Crumley, Stetler, & Horhota, 2014). In fact, objective cognition – cognitive abilities indexed by observable task performance – only accounted for a tenth of the variance in reported problems, indicating that actual performance poorly explains subjective cognition. An alternative position suggests that psychological mechanisms better describe why some older adults experience, or report, more subjective cognitive problems. Past research demonstrates that older adults with higher depression and anxiety symptoms rate their cognition more negatively (see Hill et al., 2016 for a review). However, such effects may become insignificant once personality traits are considered (Kliegel et al., 2005; Merema et al., 2013). Thus, personality – the stable, complex patterns of how one thinks, feels, and acts – might uniquely account for subjective cognition even above observable performance and affective states.

Literature on both subjective cognition and personality in older adults somewhat overlooks subjective executive function, a construct with possibly important implications. Subjective executive function describes self-reflection about behaviors necessitating attention and manipulation of information for goal-directed behavior (Diamond, 2013). While overlapping, diverse functions include *updating* that keeps information relevant in active memory, *inhibition* that prevents encoding of distracting information, and *shifting* that flexibly switches attention between different mental sets or rules (Miyake et al., 2001). Executive functions are predominantly measured using performance-based tasks. However, these instruments mainly capture decontextualized executive functions and may lack sensitivity to subtle cognitive difficulties (i.e., not at the severity of defined clinical impairment). Subjective reports can complement such measures by capturing behavioral disturbances that involve executive function and happen in daily life. Problems and changes that arise in subjective executive function have been linked to difficulties with everyday functioning and are indicative of AD disease progression, treatment adherence, and family distress (Ready, Ott, Grace, & Cahn-Weiner, 2003). Indeed, contrasting traditional measures of subjective memory, subjective executive function appears to be particularly sensitive to detecting objective memory problems and impairment in older adulthood. For example, problems in memory recall can be largely explained by older adults' problems in subjective executive function (Langlois & Belleville, 2014). In addition, subjective executive function problems correspond to subjective and diagnosed deficits in memory. For example, Rabin et al. (2006) discovered more frequent problems in updating and shifting behaviors in persons reporting subjective memory impairment (ds = 1.01 and .82) or mild cognitive impairment (ds = 1.48 and 1.10) than controls. Similarly, older adults with Alzheimer's disease (AD) report higher subjective problems in executive function compared to healthy controls (Fogarty, Almklov, Borrie, Wells, & Roth, 2017), especially in updating (d = 1.61) and shifting (d = .89). Thus, subjective executive function can capture goal-directed behaviors that impact real-world memory function. Understanding how personality traits influence subjective executive function might help detect older adults at risk for memory impairment, even in the absence of current deficits on performance-based tasks.

The earliest and most central aspect of personality traits exhibited is temperament. As an inherited attribute, temperament describes constitutional patterns of reactivity (e.g., excitability, arousability) and self-regulation (i.e., arousal modulation) (Rothbart, Ahadi, & Evans, 2000). Through factor analysis, Evan & Rothbart (2007) discovered that temperament endures in adulthood as four basic clusters: (1) effortful control, (2) negative affect, (3) extraversion/surgency, and (4) orienting sensitivity. In brief, effortful control describes tendencies to perform actions despite desired avoidance, shift attention as needed, and to suppress inappropriate behavior. Negative affect entails inclinations to anticipate distress, exhibit lower mood and energy, and to interrupt ongoing tasks. Moreover, extraversion describes patterns of social interaction and enjoyment of new and dynamic situations. Lastly, orienting sensitivity describes an aptitude to detect low-intensity stimuli from internal and external sources followed by spontaneous thought production with neutral or emotional-charged content. Unlike personality traits in later life, temperament does not require a sophisticated understanding of the self or the world but involves behavioral and emotional predispositions that stabilize in early childhood (Capsi & Silva, 1995).

Alongside general temperaments, adult personality involves basic patterns of behavior and thought that additionally incorporate beliefs, values, and cognitive styles (Evans & Rothbart, 2007). As the most universal taxonomy, the Big Five describes these higher-order traits as openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (John, 1989). In short, openness to experience describes a capacity for creativity and a predilection for diversity while conscientiousness refers to being dutiful, disciplined, and organized. Extraversion describes sociability marked by high enthusiasm and sensation seeking whereas agreeableness denotes sociability marked by prosocial conduct and trustworthiness. Lastly, neuroticism involves tendencies to worry about or feel harmful sensations and maintain negative affectivity. These traits somewhat stabilize around middle adulthood (Roberts & DelVecchio, 2000) but mild changes occur in later life. For example, some people become less open to experience, conscientious, and extraverted as they age (Donnellan & Lucas, 2008). Moreover, people become more agreeable in their seventies but less agreeable as they face health complications into their eighties (Allemand, Zimprich, & Martin, 2008; Wortman, Lucas, & Donnellan, 2012). Nonetheless, traits remain mostly stable in adulthood which might reflect persisting temperament. Specifically, conscientiousness, neuroticism, and openness demonstrate convergent associations with effortful control, negative affect, and orienting sensitivity, respectively (Rothbart, Ahadi, & Evans, 2000). Still, associations are modest (rs < .60), suggesting that taxonomies are nonorthogonal but should considered distinctly when examining relations to subjective executive function.

While scant, research suggests that personality influences subjective cognition. Regarding temperament most research focused on younger samples and attention issues. Gomez, Kryiakides, & Devlin (2014) showed that lower effortful control and higher negative affect was associated with more subjective attention in young to middle-aged adults (ages 18 to 50 years). By contrast, a handful of studies examine Big Five personality traits in older adults with a focus on subjective memory. For instance, neuroticism best predicted subjective memory problems in older adults, even after accounting for depression (Kliegel & Zimprich, 2005). Higher neuroticism also increased subjective memory problems over time, even after

correcting for mental status or affective symptoms (Comijs, Deeg, Dik, Twisk, & Jonker, 2002). Other traits are also important: lower conscientiousness and openness were associated with fewer subjective memory problems in older adults while higher neuroticism inflated complaints (Slavin, Brodaty, Kochan, Crawford, Trollor, Draper, & Sachdev, 2010). What remains unknown is whether personality associations with perceptions of attention and memory also extend to perceptions of higher-order goal behavior (i.e., subjective executive function) in older adults.

Although personality traits have been linked to other domains of subjective cognition, to our knowledge, no study has examined associations between personality and subjective executive function in older adults. To address this gap, this study conducted two investigations into the effects of temperament and Big Five personality traits on the three main components of subjective executive function (inhibition, shifting, and updating). Based on previous research in young to middle aged adults with adjacent measures of subjective cognition (Gomez et al., 2014), we hypothesized that better effortful control would correspond to better subjective executive function while negative affect would be related to poorer subjective function. Also based on prior studies on subjective memory problems (Slavin et al., 2010), we expected that higher conscientiousness would correspond to fewer problems in subjective executive function. Although prior literature does not show relations between subjective cognition with other personality traits, we will explore them as certain associations may be unique to subjective executive function.

Methods

Participants

Two samples of community-dwelling older adults were included in the current study. Sample 1 was derived from a larger project that examining the impact of billboard distraction on simulated driving performance in drivers across the lifespan, including young (ages 16–19), middle-aged (ages 35–54), and older adults (ages 65+). Detailed descriptions of the parent study can be found in previous published work (Stavrinos, Mosley, Wittig, Johnson, Decker, Sisiopiku, & Welburn, 2016; Pope, Bell, & Stavrinos, 2018). From Sample 1, the current study included only the twenty-five older adults (M_{age} = 71.66, SD = 7.02) who participated in the original study and had data on temperament and subjective executive function. Participants were primarily female (64.0%, n = 16) and Caucasian (64.0%, n = 16).

Next, Sample 2 also derived from a later study on distracted driving and simulated driving performance among younger (ages 16–19) and older drivers (ages 65+; Bell, Mirman, & Stavrinos, 2019). Like Sample 1, the present study only included data from the fifty older adults (M_{age} = 71.76, SD = 6.17) who participated in the original study and had data on Big Five personality traits and subjective executive function. This sample was nearly equally female (46.0%, n = 23) and male (50.0%, n = 25; n = 2 unreported).

Procedure

Participants in both samples were recruited from a large Southeastern community using flyers and advertisements on the university's webpage for study opportunities from 2013 to

2014 and 2016 to 2017, respectively. Study eligibility was confirmed if individuals were 65 years of age or older and answered no to the following question "*Do you have any physical disabilities that might prohibit full participation in our experimental protocol?*" In addition, participants demonstrated intact cognition, defined as receiving a passing score (>23) on the Telephone Interview for Cognitive Screening (TICS; Brandt et al., 1988). Such a score indicated that participants could adequately report their orientation in space and time, remember words, answer simple knowledge questions, and perform mental arithmetic. After providing written consent, participants were scheduled for a single in-person appointment where they completed questionnaires regarding temperament, personality, and subjective executive function. Participants received a small renumeration for their time. The study protocol was approved by the university's Institutional Review Board.

Measures

Subjective executive function.—For both samples, the Behavioral Rating Inventory of Executive Function-Adult (BRIEF-A; Roth & Gioia, 2005) provided a clinical measure of subjective executive function. Validated for persons older than 18, the BRIEF-A captures self-reported difficulties in executive function and has strong psychometric properties (Gioia, 2000). On this pen and paper instrument, participants rated their frequency of difficulty with 75 real-world behaviors within the past month using a three-point Likert scale from Never (1), Sometimes (2), to Often (3). Frequencies were then summed to calculate difficulty in specific executive function domains. For this study, we focused on domains which matched the Miyake et al.'s (2001)'s theoretical distinctions of executive function: *inhibition* (e.g., "I have problems waiting my turn"), *shifting* (e.g., I have trouble changing from one activity or task to another), *updating of working memory* (e.g., I have a short attention span). Domain and composite raw scores were converted to sex-and age-normed T-scores to reflect individual difficulty compared to a diverse multisite United States based sample (Roth & Gioia, 2005). Reliability was acceptable for subscales of inhibition (αs = .73–.83), shifting (αs = .67–.71), and working memory (αs = .83–.84). Additionally, a Negativity Scale quantified the extent to which respondents answered in an overtly negative manner on selected questions. A conservative cutoff for negative bias (>5) on this validation scale invalidated scores; however, no participants exhibited obvious negativity bias (Sample 1: M = .22, SD = .07; range = 0 to 3; Sample 2: M = .22, SD = .09; range = 0 to 2).

Adult temperament.—Sample 1 participants completed the Adult Temperament Scale (ATQ; Evans & Rothbart, 2007). This 177-item instrument captures basic patterns of reactivity and regulation including effortful control (35 items; α = .75), negative affect (46 items; α = .72), extraversion (38 items; α = .70), and orienting sensitivity (35 items; α = .84). Participants rated how different situations and attributes currently resonated with their behavior from Extremely Untrue (1) to Extremely True (7). Effortful control described tendencies to perform action despite desired avoidance, shift attention when desired, and to suppress inappropriate behavior. An example item included "*I can easily resist talking out of turn.*" Negative affect entailed inclinations to anticipate distress, exhibit lower mood and energy, and to interrupt ongoing tasks. This was portrayed in the item, "*I easily become frightened.*" Extraversion/surgency described patterns of social interaction and enjoyment of new and complex situations, described by the item "*I like to spend my free time with*

people." Orienting sensitivity involved aptitude to detect internal and external stimuli and to spontaneously produce cognitions (neutral or with emotional valence) from low intensity stimuli. An example of an item stated, "*I notice visual details in my environment.*" Items were summed with higher scores indicating more inclinations for each trait.

Big Five personality.—Sample 2 participants completed the Big Five Inventory (John & Srivastava, 1989). This questionnaire was developed to provide a briefer personality scale without a loss of validity or reliability. Indeed, the Big Five Inventory demonstrates convergent validity with much larger scales and is highly reliable (John & Srivastava, 1989). In 65 items participants rated how much they agreed that situations or attributes represent them. Specifically, for different hypothetical situations they were asked to answer using a Likert-type scale from 1 (strongly disagree) to 5 (strongly agree). Example statements included: "is inventive" for openness, "makes plans and follows through with them" for conscientiousness, "is outgoing, sociable" for extraversion, "is considerate and kind to everyone" for agreeableness and "worries a lot" for neuroticism. Items were categorized into five factors, and a sum score is calculated for each of the Big Five personality traits where higher values indicate more trait inclinations. This measure demonstrated good internal reliability within this sample (αs range from .70 to .86).

Statistical Analysis

For both samples, nonparametric descriptive statistics (respectively, Spearman rho correlations and Kruskal-Wallis test) were used to test: (a) correlations of personality/temperament measures and subjective executive function with age; and (b) differences on these variables based on sex. Next, partial least squares (PLS) structural equation models (Ringle, Wende, & Will, 2005) were constructed to determine unique personality predictors of domains of subjective executive function. This method produces similar results to multiple regression while preventing error from multiple testing. In addition, PLS provides more reliable estimates when sample sizes are modest and has been recommended for use in personality research (Willaby, Costa, Burns, MacCann, & Roberts, 2015). For the PLS path models, domains of subjective executive function were regressed on personality traits separately for temperament and Big Five traits. There were minimal intercorrelations between temperament ($|r|$s range from .04 to .20) and Big Five traits ($|r|$s range from .05 to .43), supporting their inclusion as independent exogenous variables. Additionally, age and sex were included as exogenous covariates. Unique to PLS, statistical significance is determined using bias-corrected 95% confidence intervals (95%BC CI) from extensive bootstrapping (resamples = 5000). A confidence interval without zero shows a significant effect, occurring for 95% of resamples (even after bias correction). Non-parametric bootstrap testing was appropriate as most variables were non-normally distributed (Shapiro-Wilk tests, ps < .05), except for negative affect (p = .168) and inhibition (p = .068) in Sample 1.

Results

Sample 1

Descriptives of key variables are provided in Table 1. As seen in this table, older age related to fewer issues in subjective inhibition (r_{sp} = −.44, p = .028) but did not associate with other domains of subjective executive function or traits of temperament. Concerning sex, females reported marginally higher negative affect than males (U(2) = 103.00, p = .084, d = .86). Females and males were, however, comparable on other temperament traits and on all domains of subjective executive function (ps > .10).

Next, a bootstrapped path model was calculated with temperament traits statistically predicting domains of subjective executive function (see Table 2 and Figure 1). Problems in inhibition (b = .52, 95%BC CI: −.09 to 1.11, p = .083) was marginally accounted for by higher levels of negative affect. Whereas problems in shifting (b = .77, 95%BC CI: .19 to 1.44, p = .008) and updating (b = .84, 95%BC CI: .20 to 1.48, p = .005) were predicted from higher negative affect. Effortful control, extraversion/surgency and orienting sensitivity were unrelated to reported difficulty in domains of subjective executive function (ps > .10). Age and sex were unrelated to domains of subjective executive function as well (ps > .10). This model accounted for over a fourth of individual differences in inhibition (r^2 = 32.5%) and nearly half of individual differences in shifting (r^2 = 49.1%) and updating (r^2 = 48.3%).

Sample 2

Table 3 provides descriptives of key study variables. As seen in this table, older age was only associated with greater agreeableness (r_{sp} = .29, p = .039) and no other Big Five personality traits or domains of subjective executive function (p > .10). Concerning personality, females reported greater agreeableness than males (U(2) = 6.19, p = .045, d = .63). There was also a marginal trend such that females exhibited higher conscientiousness (U(2) = 4.78, p = .092, d = .64) and lower openness to experience than males as well (U(2) = 5.81, p = .055, d = .53). In addition, females reported fewer difficulties in behaviors requiring inhibition (U(2) = 15.39, p < .001, d = 1.30) and marginally fewer difficulties in shifting (U(2) = 5.14, p = .076, d = .62).

Next, we calculated a bootstrapped path model with Big Five personality traits predicting domains of subjective executive function (see Table 4 and Figure 2). Reported problems in inhibition were significantly predicted only from higher levels of conscientiousness (b = −.39, 95%BC CI: −.97 to −.23, p = .001), whereas reported problems in shifting derived from higher neuroticism (b = .52, 95%BC CI: .15 to .90, p = .006). Similarly, greater troubles in updating was marginally predicted from lower conscientiousness (b = −.11, 95%BC CI: −.81 to .07, p = .065). Agreeableness, extraversion, and openness were unrelated with reported difficulty in domains of subjective executive function (ps > .10). Age and sex were also unrelated to domains of subjective executive function (ps > .10). This model accounted for nearly half of individual differences in inhibition (r^2 = 44.0%) and over a fourth of individual differences in shifting (r^2 = 27.9%) and updating (r^2 = 37.2%).

Discussion

In two community-based samples of cognitively-intact older adults, this study investigated how personality affected subjective executive function with key observations. Foremost, older adults with higher conscientiousness reported better subjective executive function in updating. This is sensible as conscientious describes proactive problem-solvers with a focused, controlled attention; this likely helps people stay on task and focus on relevant information. Secondly, individuals with higher negative affect or neuroticism reported more disrupted subjective executive function, especially in shifting. This aligns with the theoretical perspective that focusing on threatening information leads to disengagement from more goal-focused information (Koster, De Lissnyder, Derakshan, & De Raedt, 2011). However, we did find some distinct effects between temperament and Big Five traits and their associations with domains of subjective executive function. For instance, despite their similarity, conscientiousness but not effortful control accounted for reported problems in inhibition and updating. This might be because effortful control constrains inappropriate social behavior or desires while conscientiousness focuses primarily on attentional control. In fact, adherence to social norms falls into the Big Five's agreeableness trait, not conscientiousness, which also proved unpredictive. Because age improves adherence to social norms (Costa & McCrae, 1997), it would make more sense that problems in subjective executive function derive from interrupted attentional control rather than aberrant social behavior. Lastly, negative affect but not neuroticism linked to problems in inhibition and updating alongside shifting. This suggests that daily problems in executive function derive more from general tendencies toward distress rather than adverse self-focused moods. Overall, these results suggest that accounting for patterns of subjective executive function requires consideration of both adult temperament and Big Five personality traits.

These results contrast prior findings in other domains of subjective cognition. Regarding temperament, most studies (primarily on subjective memory) infer connections between negative affect and subjective cognitive problems. However, negative affect was indexed partially through cognitive styles or indirectly through psychological states. For instance, Jorm et al. (2004) demonstrated that more rumination, an aspect of negative affect, corresponds with greater memory complaints that interfere with daily activities. Furthermore, several studies find that higher depressive symptoms and anxiety relate to greater reported memory problems (Buckley et al, 2013; Lamb, Anderson, Saling, & Dewey, 2013). This study might suggest that negative affect, measured fully as a trait, plays a large role in subjective cognition. In addition, while studies on younger adults show a positive connection between effortful control and subjective executive function (Gomez, Kryiakides, & Devlin, 2014), the current investigation extends these findings to older adults. We also confirmed consistent relations between subjective executive function and neuroticism as well as conscientiousness. For instance, higher neuroticism and lower conscientiousness have been associated with more general cognitive complaints and memory problems (Ponds & Jolles, 1996; Slavin, Brodaty, Kochan, Crawford, Trollor, Draper, & Sachdev, 2010). However, studies have shown a negative association between openness and general cognitive complaints while agreeableness and extraversion were associated with subjective memory

problems (Slavin et al., 2010; Steinberg et al., 2013). No such associations were found herein with these traits and subjective executive function.

Although no strong theories delineate exactly how negative affect and higher neuroticism influence subjective cognition, several postulations can be made: One, people with distressful inclinations might experience more problems in subjective executive function simply because they have more errors in executive function to report on (Booth et al., 2006; Williams et al., 2010). Nonetheless, modest associations between subjective and objective cognition suggest it is more likely that traits promote worries or over-awareness of executive function performance. For example, higher neuroticism and negative affect create attentional biases toward and interference from negative stimuli which might include cognitive errors (Chan, Goodwin, & Harmer, 2007; Gomez, Gomez, & Cooper, 2002; Joormann & Gotlib, 2008; Munoz et al., 2013; Osorio et al., 2003). Another mechanism might be heighted stress reactions (Hutchinson & Ruiz, 2011; Schneider, 2004; Zoccola & Dickerson, 2012), especially when cognitive errors occur (Stawski, Mogle, & Sliwinski, 2011). Both mechanisms might lead older adults with these traits to concentrate on executive function problems more than peers and feel greater distress therefrom. Indeed, negative affect leads to cognitive styles describing these attention-stress patterns, including rumination (Perkins, Arnone, Smallwood, & Mobbs, 2015; Roelofs, Huibers, Peeters, Arntz, & van Os, 2008) and catastrophizing (Sullivan, Bishop, & Pivik, 1995). Rumination involves rethinking of negative events which additively escalates stress reactions (Zoccola & Dickerson, 2012) while catastrophizing involves exaggerated perceived threat which magnifies stress reactions (Scott, Williams, Brittlebank, & Ferrier, 1995). Thus, older adults with greater negative affect and neuroticism likely repetitively think about problems in subjective executive function and overstate their significance (e.g., *Because I cannot remember a telephone number to make a call, I must be losing my mind!*).

Conscientiousness might mitigate problems in subjective executive function through similar as well as distinct mechanisms. First, people with higher conscientiousness demonstrate lower norepinephrine, cortisol (Brummett, Boyle, Kuhn, Siegler, & Williams, 2009), and systolic blood pressure (Merecz, Makowska, & Makowiec-Dabrowska, 1999) – all factors that might dampen stress reactions and awareness of executive function problems. As a unique mechanism, conscientiousness also strengthens controlled attention which sways thoughts away from prior problems to proactive tasks (Lonigan & Vasey, 2009). Another possible mechanism is self-efficacy. This self-schema involves the perception that one can successfully accomplish goals that appear relevant to determining perceptions of *goal*-directed behavior. For example, Zlinski & Gilewski (2004) found that older adults with higher conscientiousness endorse higher memory self-efficacy which reduces odds of subjective memory problems (Ponds & Jolles, 1996); this might apply to subjective executive function as well. Lastly, findings show that conscientiousness promotes more healthy action like exercise and reduces unhealthy habits (e.g., alcohol consumption, drug use, and unhealthy eating) and disease morbidity (Bogg et al., 2008; Chapman, Lyness, & Duberstein, 2007). From better health, older adults with these traits might demonstrate improved perceptions of wellbeing that indirectly improve subjective cognition. Healthy behavior also improves executive function performance which could provide fewer errors to ruminate and report on (e.g., Bherer, Erickson, & Liu-Ambrose, 2013).

These postulations assume a directional influence between personality and subjective executive function, but future work should consider interdependence. Specifically, seminal work conceptualized negative affect as distressful reactions to failed goal achievement, suggesting dependency on subjective executive function (Evans & Rothbart, 2007). Hence, when executive function problems increase, older adults might exhibit higher negative affect and neuroticism due to insights into more goal-related disruption. Secondly, although executive function matures after temperament, rudimentary executive function emerges within the first three years of life (Hendry, Jones, & Charman, 2016) and develops alongside conscientiousness (Anderson, Anderson, Northam, Jacobs, & Catroppa, 2001; Branje, Lieshout, & Gerris, 2007). This suggests that executive function remains integral in developing effortful control and later conscientiousness; hence, degeneration of such control functions would simultaneously disturb conscientiousness in later life. A dearth of longitudinal data on subjective executive function and temperament in adulthood precludes testing temporal dependencies but such work should certainly explore reverse causality.

Findings should be considered alongside limitations. First, cross-sectional observations cannot prove a causal impact between personality and subjective executive function, although results support a moderate to large association. Cross-sectional relations also cannot discern concurrent relations from directional temporal effects. While temperament likely sets prior to maturation of executive function (Capsi & Silva, 1995), perhaps Big Five traits interact with subjective executive function as they both do not stabilize until adulthood. Thus, it is possible they affect each other reciprocally over time; longitudinal studies could elucidate such relations in the future. Moreover, ongoing aging studies should consider adding items regarding subjective executive function to inform such questions; this can also help examine differential effects on outcomes of interest (i.e., cognitive decline). Second, our study adopted the Big Five personality model that has been criticized for being overly lexical and descriptive than theoretical (Hough, 1992). Popular developmental models of self-control and attentional control might benefit our understanding of why personality shapes subjective executive function (Hay & Forrest, 2006; Rudea, Posner, & Rothbart, 2005). Nonetheless, the Big Five traits demonstrate excellent external validity with comparative heritability and stability (John & Srivastava, 1989). Next, this work did not examine how subjective executive function and personality correlate with actual memory or executive function, but this would be informative for future research. Moreover, the modest sample sizes may constrain differences in personality and subjective executive function that harm generalizability. Despite this, this study showed decent variation (shown in Table 1 and 2). Modest sample sizes might have also introduced false positives; we safeguarded against this by implementing bias-corrected bootstrapping that produced more conservative estimates. Negative affect's associations with subjective executive function could also implicate a negative reporting bias. However, the BRIEF-A showed low evidence of a negative reporting bias; plus, neuroticism did not associate with all self-reports. Though not measured here, health status might influence reports of subjective cognitive problems in older adult samples (Aarts, Van den Akker, Hajema, Verhey, & van Boxtel, 2011). Future research should examine the impact of health conditions on subjective executive function as they might represent important covariates, moderators, or mediators in associations with personality.

Although developmental questions remain, our findings hold important implications for improving understanding, and ultimately clinical assessment, of subjective cognition. First, traits important for subjective memory did not entirely contribute to subjective executive function; even neuroticism failed to demonstrate a ubiquitous impact as assumed from the broader literature (e.g., Merema et al., 2013). Such discrepancies call for inspection of personality associations across multiple subjective cognitive domains and facets to avoid overgeneralizations and to determine differential effects. Neuroticism is a known predictor of many health outcomes, psychological and physical (Lahey, 2009), and is consistently associated with subjective memory (Hill et al., 2016). In fact, some studies have found neuroticism to be more strongly associated with subjective memory than objective memory, implying that reports of memory problems in clinical settings may be more indicative of personality than subtle cognitive change. However, neuroticism was not as predictive of subjective executive function as expected from this literature. Instead conscientiousness and negative affect appeared more important. Thus, clinicians should consider personality determinants older adults' subjective cognitive complaints more carefully, including when there is no objective evidence of cognitive impairment.

Secondly, prior studies overlooked temperament with a reasonable assumption that Big Five traits, which mature later in life (Capsi & Silva, 1995), provide stronger associations with executive functions. However, we found that negative affect accounted for more between-person differences than the Big Five trait of neuroticism; thus, despite their overlap, temperament might capture broader patterns of distress that impact everyday goal attainment, like subjective executive function, than traits more focused on worries about oneself. By contrast, conscientiousness, not effortful control, was more predictive of subjective executive function, likely due to a more thorough measure of attentional control. This suggests that considering both taxonomies might be optimal to flag individuals more likely to experience problems in subjective executive function. Lastly, these findings build on a growing notion that subjective cognitive problems represent differences in personality rather than objective cognition in some older adults, and that these associations partially explain transitions into observable cognitive decline. Specifically, this study on subjective executive function and others on subjective memory show that subjective cognition comprises largely of personality influences (Hertzog et al., 2018). Although subjective cognitive domains show weak associations with current cognition, they relate highly to later cognitive decline risks. This might derive from noxious effects of covarying personality traits, namely higher neuroticism and lower conscientiousness, which associate with poorer executive function, episodic memory loss, and higher AD risk (Bridgett, Oddie, Laake, Murdock, & Bachmann, 2013; Luchetti, Terracciano, Stephan, & Sutin, 2015; McDermott & Ebmeier, 2009; Williams, Suchy, & Kraybill, 2010). Future work should longitudinally test this notion in multiple domains of subjective cognition while considering broad and narrow personality traits.

Conclusion

By 2050, the number older adults living with AD will double, prioritizing healthier cognitive aging (CDC, 2018). Within the Healthy Brain Initiative, the National Institute on Aging and Centers for Disease Control called for improving our understanding of early risk factors that

contribute to later pathological states. One factor may be subjective executive dysfunction that discerns normal cognition from mild cognitive impairment (Rabin et al., 2006) and AD (Fogarty et al., 2017). Reports of cognitive problems by older adults commonly precede objective identification of cognitive deficits, but these reports can stem from multiple causes. As shown in previous work, it's unlikely that subjective problems accurately reflect current objective difficulties; instead, they are likely influenced by multiple factors, including personality differences. In our study, negative affect explained nearly half of individuals' differences in subjective executive function, whereas neuroticism and conscientiousness explained nearly two fifths of the variation in reported issues. Findings suggest that temperament and Big Five personality traits associate with subjective executive function.

Acknowledgements and Funding:

This work was supported by the Alabama Department of Transportation (ALDOT) and Georgia Tech for the US Department of Transportation. The opinions, views, or comments expressed in this paper are those of the authors and do not necessarily represent the official positions of funding departments. A special thank you to the UAB Edward R. Roybal Center for Translational Research in Aging and Mobility NIA 2 P30 AG022838, the UAB Department of Psychology, and the Translational Research for Injury Prevention (TRIP) Laboratory.

References

Aarts S, Van den Akker M, Hajema KJ, Van Ingen AM, Metsemakers JFM, Verhey FRJ, & van Boxtel MPJ (2011). Multimorbidity and its relation to subjective memory complaints in a large general population of older adults. International Psychogeriatrics, 23(4), 616–624. [PubMed: 21044401]

Allemand M, Zimprich D, & Hendriks AA (2008). Age differences in five personality domains across the life span. Developmental Psychology, 44(3), 758–770. [PubMed: 18473642]

Anderson VA, Anderson P, Northam E, Jacobs R, & Catroppa C. (2001). Development of executive functions through late childhood and adolescence in an Australian sample. Developmental Neuropsychology, 20(1), 385–406. [PubMed: 11827095]

Bandura A. (1989). Regulation of cognitive processes through perceived self-efficacy. Developmental psychology, 25(5), 729–735.

Bassett SS, & Folstein MF (1993). Memory complaint, memory performance, and psychiatric diagnosis: A community study. Journal of Geriatric Psychiatry and Neurology, 6(2), 105–111. [PubMed: 8512626]

Bell T, Mirman JH, & Stavrinos D. (2019). Pain, pain catastrophizing, and individual differences in executive function in adolescence. Children's Health Care, 48(1), 18–37.

Benito-León J, Mitchell AJ, Vega S, & Bermejo-Pareja F. (2010). A population-based study of cognitive function in older people with subjective memory complaints. Journal of Alzheimer's Disease, 22(1), 159–170.

Bherer L, Erickson KI, & Liu-Ambrose T. (2013). Physical exercise and brain functions in older adults. Journal of Aging Research, 2013, 197326–197326.

Bogg T, Voss MW, Wood D, & Roberts BW (2008). A hierarchical investigation of personality and behavior: Examining Neo-Socioanalytic models of health-related outcomes. Journal of Research in Personality, 42(1), 183–207.

Booth JE, Schinka JA, Brown LM, Mortimer JA, & Borenstein AR (2006). Five-factor personality dimensions, mood states, and cognitive performance in older adults. Journal of Clinical and Experimental Neuropsychology, 28(5), 676–683. [PubMed: 16723316]

Brandt J, Spencer M, & Folstein M. (1988). The telephone interview for cognitive status. Neuropsychiatry Neuropsychol Behav Neurol, 1(2), 111–117.

Branje SJ, Van Lieshout CF, & Gerris JR (2007). Big Five personality development in adolescence and adulthood. European Journal of Personality: Published for the European Association of Personality Psychology, 21(1), 45–62.

Brans K, Koval P, Verduyn P, Lim YL, & Kuppens P. (2013). The regulation of negative and positive affect in daily life. Emotion, 13(5), 926. [PubMed: 23731436]

Bridgett DJ, Oddi KB, Laake LM, Murdock KM, & Bachmann MN (2013). Integrating and differentiating aspects of self-regulation: Effortful control, executive functioning, and links to negative affectivity. Emotion, 13, 47–63. [PubMed: 22906086]

Brummett BH, Boyle SH, Kuhn CM, Siegler IC, & Williams RB (2009). Positive affect is associated with cardiovascular reactivity, norepinephrine level, and morning rise in salivary cortisol. Psychophysiology, 46(4), 862–869. [PubMed: 19470128]

Buckley RF, Maruff P, Ames D, Bourgeat P, Martins RN, Masters CL, … & Villemagne VL (2016). Subjective memory decline predicts greater rates of clinical progression in preclinical Alzheimer's disease. Alzheimer's & Dementia, 12(7), 798–804.

Buckley R, Saling MM, Ames D, Rowe CC, Lautenschlager NT, Macaulay SL, … & Szoeke C. (2013). Factors affecting subjective memory complaints in the AIBL aging study: biomarkers, memory, affect, and age. International Psychogeriatrics, 25(8), 1307–1315. [PubMed: 23693133]

Capsi A, & Silva PA (1995). Temperament qualities at age three predict personality traits in young

Centers for Disease Control and Prevention (2013). The state of aging and health in America 2013. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services. Adulthood: Longitudinal evidence from a birth cohort. Child Development, 66(2), 486–498.

Chan SW, Goodwin GM, & Harmer CJ (2007). Highly neurotic never-depressed students have negative biases in information processing. Psychological Medicine, 37(9), 1281–1291. [PubMed: 17493298]

Chapman BP, Duberstein PR, Sörensen S, & Lyness JM (2006). Personality and perceived health in older adults: The Five Factor model in primary care. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 61(6), 362–365.

Chapman BP, Lyness JM, & Duberstein P. (2007). Personality and medical illness burden among older adults in primary care. Psychosomatic Medicine, 69(3).

Comijs HC, Deeg DJH, Dik MG, Twisk JWR, & Jonker C. (2002). Memory complaints; the association with psycho-affective and health problems and the role of personality characteristics: a 6-year follow-up study. Journal of Affective Disorders, 72(2), 157–165. [PubMed: 12200206]

Costa PT, & McCrae RR (1997). Longitudinal stability of adult personality. In Handbook of Personality Psychology (pp. 269–290).

Crowell TA, Luis CA, Vanderploeg RD, Schinka JA, & Mullan M. (2002). Memory patterns and executive functioning in mild cognitive impairment and Alzheimer's disease. Aging, Neuropsychology, and Cognition, 9(4), 288–297.

Crumley JJ, Stetler CA, & Horhota M. (2014). Examining the relationship between subjective and objective memory performance in older adults: A meta-analysis. Psychology and Aging, 29(2), 250. [PubMed: 24955993]

De Frias CM, Dixon RA, & Bäckman L. (2003). Use of memory compensation strategies is related to psychosocial and health indicators. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 58(1), 12–22.

Diamond A. (2013). Executive functions. Annual Review of Psychology, 64, 135–168.

Donnellan MB, & Lucas RE (2008). Age differences in the Big Five across the life span: Evidence from two national samples. Psychology and Aging, 23(3), 558–556. [PubMed: 18808245]

Duberstein PR, Sörensen S, Lyness JM, King DA, Conwell Y, Seidlitz L, & Caine ED (2003). Personality is associated with perceived health and functional status in older primary care patients. Psychology and Aging, 18(1), 25–37. [PubMed: 12641310]

Evans DE, & Rothbart MK (2007). Developing a model for adult temperament. Journal of Research in Personality, 41(4), 868–888.

Fogarty J, Almklov E, Borrie M, Wells J, & Roth RM (2017). Subjective rating of executive functions in mild Alzheimer's disease. Aging & Mental Health, 21(11), 1184–1191. [PubMed: 27454406]

Galla BM, & Wood JJ (2015). Trait self-control predicts adolescents' exposure and reactivity to daily stressful events. Journal of Personality, 83(1), 69–83. [PubMed: 24354437]

Gioia GA, Isquith PK, Guy SC, & Kenworthy L. (2000). Test review behavior rating inventory of executive function. Child Neuropsychology, 6(3), 235–238. [PubMed: 11419452]

Gomez R, Gomez A, & Cooper A. (2002). Neuroticism and extraversion as predictors of negative and positive emotional information processing: Comparing Eysenck's, Gray's, and Newman's theories. European Journal of Personality, 16(5), 333–350.

Gomez R, Kyriakides C, & Devlin E. (2014). Attention-Deficit/Hyperactivity Disorder symptoms in an adult sample: Associations with Rothbart's temperament dimensions. Personality and Individual Differences, 60, 73–78.

Hay C, & Forrest W. (2006). The development of self-control: Examining self-control theory's stability thesis. Criminology, 44(4), 739–774.

Hendry A, Jones EJ, & Charman T. (2016). Executive function in the first three years of life: Precursors, predictors and patterns. Developmental Review, 42, 1–33.

Hill NL, McDermott C, Mogle J, Munoz E, DePasquale N, Wion R, & Whitaker E. (2017). Subjective cognitive impairment and quality of life: A systematic review. International Psychogeriatrics, 29(12), 1965–1977. [PubMed: 28829003]

Hill NL, Mogle J, Wion R, Munoz E, DePasquale N, Yevchak AM, & Parisi JM (2016). Subjective cognitive impairment and affective symptoms: A systematic review. The Gerontologist, 56(6), e109–e127. [PubMed: 27342440]

Hohman TJ, Beason-Held LL, Lamar M, & Resnick SM (2011). Subjective cognitive complaints and longitudinal changes in memory and brain function. Neuropsychology, 25(1), 125–130. [PubMed: 20919769]

Hough LM (1992). The 'Big Five' personality variables – construct confusion: Description versus prediction. Human Performance, 5(1–2), 139–155.

Hutchinson JG, & Ruiz JM (2011). Neuroticism and cardiovascular response in women: evidence of effects on blood pressure recovery. Journal of Personality, 79(2), 277–302. [PubMed: 21395589]

Iwasa H, Masui Y, Gondo Y, Inagaki H, Kawaai C, & Suzuki T. (2008). Personality and all-cause mortality among older adults dwelling in a Japanese community: A five-year population-based prospective cohort study. The American Journal of Geriatric Psychiatry, 16(5), 399–405. [PubMed: 18403571]

John OP, & Srivastava S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives In Pervin LA & John OP (Eds.), Handbook of personality: Theory and research (Vol. 2, pp. 102–138). New York: Guilford Press.

Jerant A, Chapman B, Duberstein P, Robbins J, & Franks P. (2011). Personality and medication non-adherence among older adults enrolled in a six-year trial. British Journal of Health Psychology, 16(1), 151–169. [PubMed: 21226789]

Joormann J, & Gotlib IH (2008). Updating the contents of working memory in depression: Interference from irrelevant negative material. Journal of Abnormal Psychology, 117(1), 182–192. [PubMed: 18266496]

Jorm AF, Butterworth P, Anstey KJ, Christensen H, Easteal S, Maller J, … & Sachdev P. (2004). Memory complaints in a community sample aged 60–64 years: associations with cognitive functioning, psychiatric symptoms, medical conditions, APOE genotype, hippocampus and amygdala volumes, and white-matter hyperintensities. Psychological Medicine, 34(8), 1495–1506. [PubMed: 15724880]

Kielb S, Rogalski E, Weintraub S, & Rademaker A. (2017). Objective features of subjective cognitive decline in a United States national database. Alzheimer's & Dementia, 13(12), 1337–1344.

Kliegel M, Zimprich D, & Eschen A. (2005). What do subjective cognitive complaints in persons with aging-associated cognitive decline reflect? International Psychogeriatrics, 17(3), 499–512. [PubMed: 16252381]

Koster EH, De Lissnyder E, Derakshan N, & De Raedt R. (2011). Understanding depressive rumination from a cognitive science perspective: The impaired disengagement hypothesis. Clinical Psychology Review, 31(1), 138–145. [PubMed: 20817334]

Jesson F, Wolfsgruber S, Wiese B, Bickel H, Mosch E, Kaduszkiewicz H, … & Weyerer S. (2014). AD dementia risk in late MCI, in early MCI, and in subjective cognitive impairment. Alzheimer's & Dementia, 10(1), 76–83.

John OP (1989). Towards a taxonomy of personality descriptors In Personality Psychology (pp. 261–271). Springer, New York, NY.

Jonker C, Geerlings MI, & Schmand B. (2000). Are memory complaints predictive for dementia? A review of clinical and population-based studies. International Journal of Geriatric Psychiatry, 15(11), 983–991. [PubMed: 11113976]

Lahey BB (2009). Public health significance of neuroticism. The American Psychologist, 64(4), 241–256. doi:10.1037/a0015309 [PubMed: 19449983]

Lamb F, Anderson J, Saling M, & Dewey H. (2013). Predictors of subjective cognitive complaint in postacute older adult stroke patients. Archives of Physical Medicine and Rehabilitation, 94(9), 1747–1752. [PubMed: 23529143]

Langlois AS, & Belleville S. (2014). Subjective cognitive complaint in healthy older adults: identification of major domains and relation to objective performance. Aging, Neuropsychology, and Cognition, 21(3), 257–282.

Lee SD, Ong B, Pike KE, & Kinsella GJ (2018). Prospective memory and subjective memory decline: A neuropsychological indicator of memory difficulties in community-dwelling older people. Journal of Clinical and Experimental Neuropsychology, 40(2), 183–197. [PubMed: 28532271]

Lonigan CJ, & Vasey MW (2009). Negative affectivity, effortful control, and attention to threat-relevant stimuli. Journal of Abnormal Child Psychology, 37(3), 387–399. [PubMed: 19043783]

Marino SE, Meador KJ, Loring DW, Okun MS, Fernandez HH, Fessler AJ, … & Schoenberg MR (2009). Subjective perception of cognition is related to mood and not performance. Epilepsy & Behavior, 14(3), 459–464. [PubMed: 19130899]

McCrae RR, & Costa PT Jr (1997). Personality trait structure as a human universal. American Psychologist, 52(5), 509–516. [PubMed: 9145021]

McDermott LM, & Ebmeier KP (2009). A meta-analysis of depression severity and cognitive function. Journal of Affective Disorders, 119(1–3), 1–8. [PubMed: 19428120]

Merecz D, Makowska Z, & Makowiec-Dabrowska T. (1999). The assessment of Big Five Personality Factors and Temperament Domains as modifiers of cardiovascular response to occupational stress. International Journal of Occupational Medicine and Environmental Health, 12(3), 273–284. [PubMed: 10581868]

Merema MR, Speelman CP, Foster JK, & Kaczmarek EA (2013). Neuroticism (not depressive symptoms) predicts memory complaints in some community-dwelling older adults. The American Journal of Geriatric Psychiatry, 21(8), 729–736. [PubMed: 23834858]

Miyake A, Friedman NP, Rettinger DA, Shah P, & Hegarty M. (2001). How are visuospatial working memory, executive functioning, and spatial abilities related? A latent-variable analysis. Journal of Experimental Psychology: General, 130(4), 621–640. [PubMed: 11757872]

Molinuevo JL, Rabin LA, Amariglio R, Buckley R, Dubois B, Ellis KA, … & Reisberg B. (2017). Implementation of subjective cognitive decline criteria in research studies. Alzheimer's & Dementia, 13(3), 296–311.

Montejo P, Montenegro M, Fernandez MA, & Maestu F. (2012). Memory complaints in the elderly: quality of life and daily living activities. A population-based study. Archives of Gerontology and Geriatrics, 54(2), 298–304. [PubMed: 21764152]

Munoz E, Sliwinski MJ, Smyth JM, Almeida DM, & King HA (2013). Intrusive thoughts mediate the association between neuroticism and cognitive function. Personality and Individual Differences, 55(8), 898–903. [PubMed: 24683284]

Murdock KW, Oddi KB, & Bridgett DJ (2013). Cognitive correlates of personality: Links between executive functioning and the big five personality traits. Journal of Individual Differences, 34(2), 97–104.

Neupert SD, Mroczek DK, & Spiro III A. (2008). Neuroticism moderates the daily relation between stressors and memory failures. Psychology and Aging, 23(2), 287–296. [PubMed: 18573003]

Newson RS, & Kemps EB (2006). The nature of subjective cognitive complaints of older adults. The International Journal of Aging and Human Development, 63(2), 139–151. [PubMed: 17137031]

Osorio LC, Cohen M, Escobar SE, Salkowski-Bartlett A, & Compton RJ (2003). Selective attention to stressful distracters: effects of neuroticism and gender. Personality and Individual Differences, 34(5), 831–844.

Perkins AM, Arnone D, Smallwood J, & Mobbs D. (2015). Thinking too much: Self-generated thought as the engine of neuroticism. Trends in Cognitive Sciences, 19(9), 492–498. [PubMed: 26320724]

Pope CN, Bell TR, & Stavrinos D. (2017). Mechanisms behind distracted driving behavior: The role of age and executive function in the engagement of distracted driving. Accident Analysis & Prevention, 98, 123–129. [PubMed: 27716494]

Ponds RW, & Jolles J. (1996). Memory complaints in elderly people: The role of memory abilities, metamemory, depression, and personality. Educational Gerontology: An International Quarterly, 22(4), 341–357.

Rabin LA, Roth RM, Isquith PK, Wishart HA, Nutter-Upham KE, Pare N, … & Saykin AJ (2006). Self-and informant reports of executive function on the BRIEF-A in MCI and older adults with cognitive complaints. Archives of Clinical Neuropsychology, 21(7), 721–732. [PubMed: 16979868]

Ready RE, Ott BR, Grace J, & Cahn-Weiner DA (2003). Apathy and executive dysfunction in mild cognitive impairment and Alzheimer disease. The American Journal of Geriatric Psychiatry, 11(2), 222–228. [PubMed: 12611752]

Reisberg B, Shulman MB, Torossian C, Leng L, & Zhu W. (2010). Outcome over seven years of healthy adults with and without subjective cognitive impairment. Alzheimer's & Dementia, 6(1), 11–24.

Ringle CM, Wende S, & Will S. (2005). SmartPLS 2.0 (M3) Beta, Hamburg 2005.

Roberts BW, & DelVecchio WF (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. Psychological Bulletin, 126(1), 3–25. [PubMed: 10668348]

Robins Wahlin TB, & Byrne GJ (2011). Personality changes in Alzheimer's disease: A systematic review. International Journal of Geriatric Psychiatry, 26(10), 1019–1029. [PubMed: 21905097]

Robinson MD, Ode S, Moeller SK, & Goetz PW (2007). Neuroticism and affective priming: Evidence for a neuroticism-linked negative schema. Personality and individual differences, 42(7), 1221–1231. [PubMed: 18449325]

Roelofs J, Huibers M, Peeters F, Arntz A, & van Os J. (2008). Rumination and worrying as possible mediators in the relation between neuroticism and symptoms of depression and anxiety in clinically depressed individuals. Behaviour Research and Therapy, 46(12), 1283–1289. [PubMed: 19006785]

Roth RM, & Gioia GA (2005). Behavior rating inventory of executive function--adult version. Lutz, FL: Psychological Assessment Resources.

Rothbart MK, Ahadi SA, & Evans DE (2000). Temperament and personality: origins and outcomes. Journal of Personality and Social Psychology, 78(1), 122–135. [PubMed: 10653510]

Rueda MR, Rothbart MK, McCandliss BD, Saccomanno L, & Posner MI (2005). Training, maturation, and genetic influences on the development of executive attention. Proceedings of the National Academy of Sciences, 102(41), 14931–14936.

Schneider TR (2004). The role of neuroticism on psychological and physiological stress responses. Journal of Experimental Social Psychology, 40(6), 795–804.

Scott J, Williams JMG, Brittlebank A, & Ferrier IN (1995). The relationship between premorbid neuroticism, cognitive dysfunction and persistence of depression: a 1-year follow-up. Journal of Affective Disorders, 33(3), 167–172. [PubMed: 7790668]

Sisiopiku VP, Islam MM, Wittig S, Welburn SC, & Stavrinos D. (2014). Perceived and real impacts of digital advertising billboards on driving performance. Advances in Human Aspects of Transportation: Part II, 8, 408–419.

Slavin MJ, Brodaty H, Kochan NA, Crawford JD, Trollor JN, Draper B, & Sachdev PS (2010). Prevalence and predictors of "subjective cognitive complaints" in the Sydney Memory and Ageing Study. The American Journal of Geriatric Psychiatry, 18(8), 701–710. [PubMed: 21491631]

Snitz BE, Morrow LA, Rodriguez EG, Huber KA, & Saxton JA (2008). Subjective memory complaints and concurrent memory performance in older patients of primary care providers. Journal of the International Neuropsychological Society, 14(6), 1004–1013. [PubMed: 18954480]

Stavrinos D, Mosley PR, Wittig SM, Johnson HD, Decker JS, Sisiopiku VP, & Welburn SC (2016). Visual behavior differences in drivers across the lifespan: A digital billboard simulator study. Transportation Research Part F: Traffic Psychology and Behaviour, 41, 19–28.

Soubelet A, & Salthouse TA (2011). Personality–cognition relations across adulthood. Developmental Psychology, 47(2), 303–310. [PubMed: 21142358]

Spano G, Caffò AO, & Bosco A. (2018). Cognitive functioning, subjective memory complaints and risky behaviour predict minor home injuries in elderly. Aging Clinical and Experimental Research, 30(8), 985–991. [PubMed: 29181769]

Steinberg SI, Negash S, Sammel MD, Bogner H, Harel BT, Livney MG, … & Arnold SE (2013). Subjective memory complaints, cognitive performance, and psychological factors in healthy older adults. American Journal of Alzheimer's Disease & Other Dementias, 28(8), 776–783.

St John P, & Montgomery P. (2002). Are cognitively intact seniors with subjective memory loss more likely to develop dementia? International Journal of Geriatric Psychiatry, 17(9), 814–820. [PubMed: 12221654]

Sullivan MJ, Bishop SR, & Pivik J. (1995). The Pain Catastrophizing Scale: Development and validation. Psychological Assessment, 7(4), 524.

Sutin AR, Terracciano A, Deiana B, Naitza S, Ferrucci L, Uda M, … & Costa PT (2010). High neuroticism and low conscientiousness are associated with interleukin-6. Psychological Medicine, 40(9), 1485–1493. [PubMed: 19995479]

Stawski RS, Mogle J, & Sliwinski MJ (2011). Intraindividual coupling of daily stressors and cognitive interference in old age. Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 66(suppl_1), i121–i129.

Verstraeten K, Vasey MW, Raes F, & Bijttebier P. (2009). Temperament and risk for depressive symptoms in adolescence: Mediation by rumination and moderation by effortful control. Journal of Abnormal Child Psychology, 37(3), 349–361. [PubMed: 19107592]

Weaver Cargin J, Collie A, Masters C, & Maruff P. (2008). The nature of cognitive complaints in healthy older adults with and without objective memory decline. Journal of Clinical and Experimental Neuropsychology, 30(2), 245–257. [PubMed: 18938676]

Willaby HW, Costa DS, Burns BD, MacCann C, & Roberts RD (2015). Testing complex models with small sample sizes: A historical overview and empirical demonstration of what partial least squares (PLS) can offer differential psychology. Personality and Individual Differences, 84, 73–78.

Williams PG, Suchy Y, & Kraybill ML (2010). Five-factor model personality traits and executive functioning among older adults. Journal of Research in Personality, 44(4), 485–491.

Wilson RS, Krueger KR, Gu L, Bienias JL, de Leon CFM, & Evans DA (2005). Neuroticism, extraversion, and mortality in a defined population of older persons. Psychosomatic Medicine, 67(6), 841–845. [PubMed: 16314587]

Wood BM, Nicholas MK, Blyth F, Asghari A, & Gibson S. (2013). Catastrophizing mediates the relationship between pain intensity and depressed mood in older adults with persistent pain. The Journal of Pain, 14(2), 149–157. [PubMed: 23265846]

Wortman J, Lucas RE, & Donnellan MB (2012). Stability and change in the Big Five personality domains: Evidence from a longitudinal study of Australians. Psychology and Aging, 27(4), 867. [PubMed: 22775362]

Zelinski Elizabeth M., and Gilewski MJ (2004). A 10-item Rasch modeled memory self-efficacy scale. Aging & Mental Health. 8(4), 293–306. [PubMed: 15370046]

Zoccola PM, & Dickerson SS (2012). Assessing the relationship between rumination and cortisol: A review. Journal of Psychosomatic Research, 73(1), 1–9. [PubMed: 22691553]

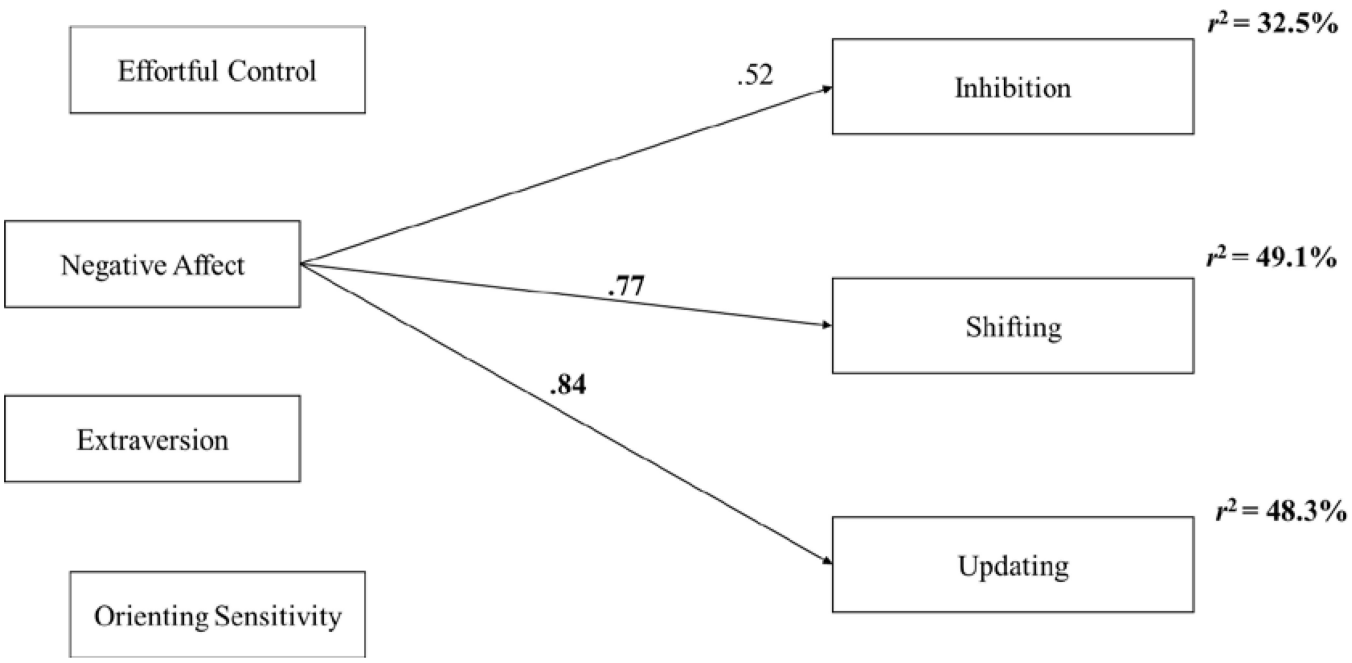

Figure 1.

Path model examining associations between temperament traits and subjective executive function.

Note. Only significant (bolded, $p < .05$) and marginally significant (non-bolded, $p < .10$) paths shown. Model controlled for age and gender effects that were nonsignificant (ps > .10).

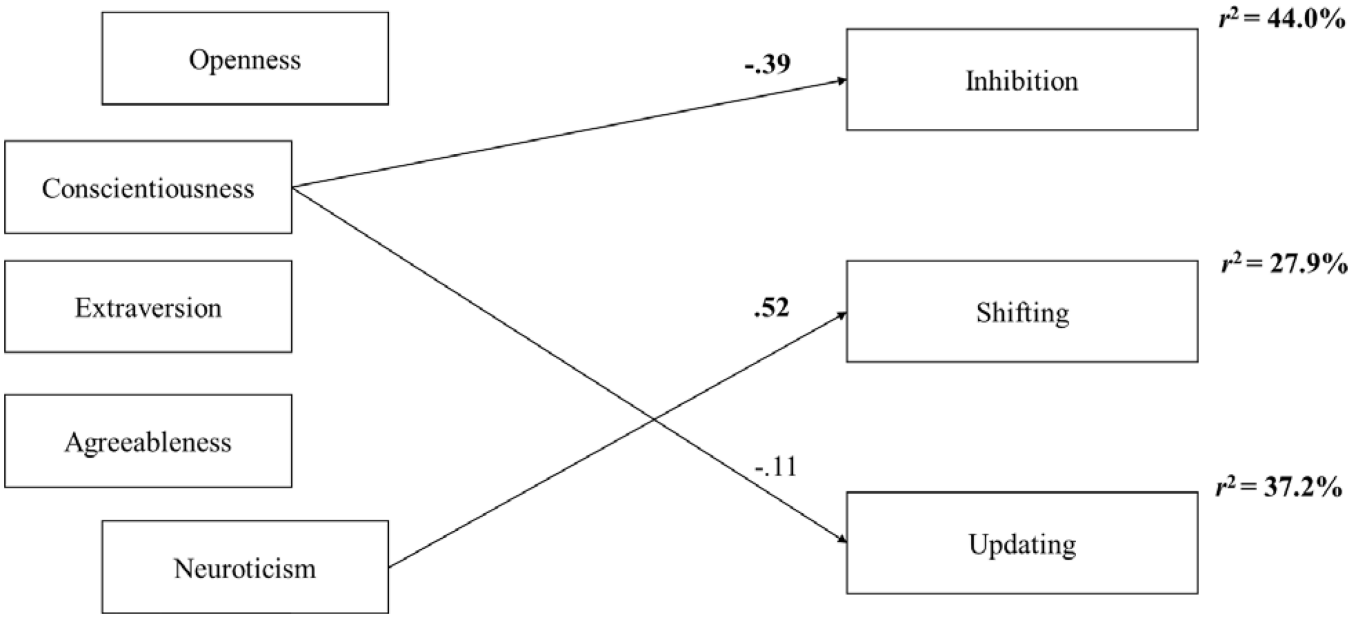

Figure 2.

Path model examining associations between Big Five personality traits and subjective executive function.

Note. Only significant (bolded, $p < .05$) and marginally significant (non-bolded, $p < .10$) paths shown. Model controlled for age and gender effects that were nonsignificant ($ps > .10$).

Table 1.

Descriptive statistics for Sample 1

	Overall (*n* = 25)		**Age Correlation**	**Female (*n* = 16)**		**Male (*n* = 9)**		
Temperament	*M*	*SD*	Spearman *R*	*M*	*SD*	*M*	*SD*	p^a
Effortful Control	4.08	.89	−.17	4.33	.74	3.64	.99	.187
Negative Affect	3.77	.86	.31	4.03	.67	3.30	.99	.084
Extraversion/Surgency	3.95	.77	−.07	4.04	.68	3.80	.93	.718
Orienting Sensitivity	4.55	1.08	−.02	4.73	.61	4.22	1.61	.846
Subjective EF.								
Inhibition	52.36	6.92	$-.44^*$	53.25	6.97	50.78	6.94	.487
Shifting	53.08	9.81	−.20	53.38	8.46	52.56	12.41	.718
Updating	54.24	11.45	−.34	53.88	12.00	54.89	11.08	.677

Note. EF = executive function;

[a] *p*-value for Mann-Whitney U test between females and males;

[*] $p < .05$.

Table 2.

Path Model Results for Sample 1.

Exogenous Variable	Endogenous Variable	*b*	95%CI LL	95%CI UL	*p*
Age	Inhibition	−0.31	−0.76	0.22	.250
	Shifting	0.23	−0.37	0.76	.417
	Updating	0.16	−0.44	0.66	.458
Gender	Inhibition	−0.06	−0.57	0.44	.939
	Shifting	−0.13	−0.57	0.37	.536
	Updating	−0.24	−0.61	0.18	.157
Negative Affect	**Inhibition**†	0.52	−0.09	1.11	.083
	Shifting*	0.77	0.20	1.44	.008
	Updating*	0.84	0.19	1.48	.005
Effortful Control	Inhibition	−0.11	−0.82	0.40	.868
	Shifting	−0.32	−0.91	0.29	.194
	Updating	−0.24	−0.75	0.18	.280
Extraversion	Inhibition	0.00	−0.58	0.59	.839
	Shifting	0.14	−0.42	0.67	.417
	Updating	0.33	−0.27	0.85	.228
Orienting Sensitivity	Inhibition	−0.06	−0.69	0.51	.696
	Shifting	−0.08	−0.61	0.58	.901
	Updating	−0.31	−0.94	0.25	.343

Note.

$^{*}p < .05$.

$^{\dagger}p < .10$.

Table 3.

Descriptive statistics for Sample 2.

	Overall (*n* = 50)		**Age Correlation**	**Female (*n* = 23)**		**Male (*n* = 25)**		
Personality	*M*	*SD*	*r*	*M*	*SD*	*M*	*SD*	p^a
Openness	33.32	29.84	−.02	24.00	24.33	38.84	31.45	.055
Conscientiousness	77.32	22.37	.02	84.61	16.57	71.48	24.30	.092
Extraversion	48.60	26.70	.04	50.39	30.02	47.40	24.19	.911
Agreeableness	73.40	21.99	.29*	81.22	15.91	68.04	24.39	.045
Neuroticism	24.08	20.33	−.23	21.09	17.89	25.96	22.88	.551
Subjective EF.								
Inhibition	52.20	9.32	−.01	46.91	6.45	57.16	9.09	<.001
Shifting	53.74	9.94	−.07	50.87	8.56	56.76	10.42	.076
Updating	57.92	13.61	−.01	54.74	13.03	60.56	13.77	.201

Note. EF = executive function;

[a] *p*-value for Mann-Whitley U test between females and males;

* $p < .05$.

Table 4.

Path Model Results for Sample 2.

Exogenous Variable	Endogenous Variable	*b*	95%CI LL	95%CI UL	*p*
Age	Inhibition	0.00	−0.18	0.32	.805
	Shifting	−0.01	−0.20	0.39	.678
	Updating	0.00	−0.33	0.36	.920
Gender	Inhibition	0.14	−0.13	0.38	.324
	Shifting	0.22	−0.04	0.56	.243
	Updating	0.03	−0.16	0.28	.822
Openness	Inhibition	0.08	−0.22	0.35	.414
	Shifting	−0.13	−0.45	0.17	.467
	Updating	−0.05	−0.30	0.20	.782
Conscientious	**Inhibition** *	−0.39	−0.97	−0.23	.001
	Shifting	−0.21	−0.20	0.52	.586
	Updating †	−0.11	−0.81	0.08	.065
Extraverted	Inhibition	−0.21	−0.48	0.08	.148
	Shifting	−0.11	−0.42	0.22	.479
	Updating	−0.10	−0.36	0.17	.463
Agreeableness	Inhibition	0.02	−0.37	0.25	.999
	Shifting	−0.61	−0.42	0.31	.809
	Updating	0.15	−0.38	0.30	.795
Neuroticism	Inhibition	−0.06	−0.45	0.35	.840
	Shifting *	0.52	0.15	0.90	.006
	Updating	0.23	−0.24	0.69	.319

* Note. $p < .05$.

† $p < .10$.