Executive Functioning and Purpose in Life Among Emerging Adults in College

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EXECUTIVE FUNCTIONING AND PURPOSE IN LIFE
AMONG EMERGING ADULTS IN COLLEGE

A Dissertation
presented in partial fulfillment of requirements
for the degree of Doctor of Philosophy
in the department of Psychology with an emphasis in Clinical Psychology
The University of Mississippi

by
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ABSTRACT

_Br_**ackground:** Executive functioning (EF) is a complex neurocognitive concept that grew from the field of neuropsychology and has been explored through various avenues. The most accepted theoretical organization of EF includes a three-factor model that is comprised of inhibition, updating, and shifting. The three-factor conceptualization can be measured through various objective EF neuropsychological assessments and self-reported levels of EF abilities. Goal-planning and organizing cognitive processes are another important facet of EF, as they involve self-regulation abilities. Individuals able to “regulate” themselves behaviorally and move towards goals tend to be more successful and move towards their purpose in life. A facet of positive psychology, purpose has demonstrated extensive benefits including overall general well-being. Additionally, purpose includes concepts that relate to higher-level processes that include relate to the three-factor model of EF: inhibition, updating, and shifting. Despite the commonalities listed between EF and purpose in life, examination of a possible relationship between the two concepts has yet to be undertaken. **Methods:** To explore the relationship between EF and purpose in life, online self-report measures were administered including the Barkley Deficits in Executive Functioning Scale, Short Form (BDEFS-SF), the Claremont Purpose Scale (CPS), the Short Self-Regulation Questionnaire (SSRQ), the Meaning in Life (MLQ), and the Valued Living Questionnaire (VLQ). Objective measures of EF utilizing the Delis-Kaplan Executive Functioning System (D-KEFS) were also obtained through in-lab participation. **Results:** Pearson $r$ correlations analyses were calculated using BDEFS-SF
summary scores and CPS total scores, yielding a significant negative correlation between EF deficits and total perceived purpose. This was followed up by a simple linear regression analyses to further determine the nature and extent of the relationship between the BDEFS-SF subscales on CPS total scores. Resulted indicated less deficits in Self-Management to Time significantly predicted participants’ perceived purpose in life as did less deficits in Self-Motivation. Due to COVID-19, only a small number of in-lab participant data was collected, yielding non-significant regression model of D-KEFS subtests on total CPS scores. Discussion: The present findings suggest that a relationship with EF capabilities and purpose in life, such that better EF capabilities were associated with higher levels of perceived purpose in life. Thus, further examination of the overlap between the of neuropsychological and positive psychology concepts and how both can be utilized to inform clinical interventions is warranted. Due to COVID-19 restrictions during the administration of the present study, various limitations regarding objective measure data impacted some results.

Keywords: executive functioning, self-regulation, purpose in life, goal-setting, neuropsychology
DEDICATION

This work is dedicated to everyone from my hometown of sunny Southern California, the islands of Hawai’i, the boroughs of New York City, and down to Deep South who have helped me grow along this 12-year higher education journey – personally, culturally, mentally, and purposefully. And to my baby brother, Aiden Jake, who’s autism diagnosis catapulted my interest in gaining a better understanding of the uniqueness one brings to a family and to a community.
ACKNOWLEDGMENTS

I would like to extend extreme appreciation to my advisor, Dr. Stefan E. Schulenberg, who has not only encouraged me complete this project, but has supported me tremendously throughout my graduate education at the University of Mississippi. I would also like to acknowledge my committee members – Dr. Scott Gustafson, Dr. Stephanie Miller, and Dr. Tossi Ikuta – for their understanding and flexibility in completing this project during a global pandemic. I would like to thank my family for always being my biggest cheerleaders when I could not muster my usual peppy energy to continuing pursuing my goals.
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CHAPTER I: INTRODUCTION

When looking at how to define executive functioning (EF), one finds a multitude of definitions, explanations, and theories to choose from. Regardless of the various descriptions, EF refers to a group of neurocognitive processes that are involved in inhibitory behaviors, goal-directed planning and behavior, and emotional control (Lezak, 1982; Miyake et al., 2000). The most basic description of EF generally considers cognitive control, which is associated with prefrontal cortex (PFC) activity as well as other brain regions such as the basal ganglia, the thalamus, and the cerebellum (e.g., Kane & Engle, 2002; Roberts et al., 1998; Shimamura, 2000; Suchy, 2009). However, even within these various EF components, each is distinct and can be measured differently despite this “umbrella” term (Miller & Cohen, 2001).

Commonly measured components of EF in research as well as clinical use include inhibition (i.e., the ability to override behavioral routines), updating (i.e., working memory), and shifting (i.e., switching between sets of rules or directions; Miyake & Friedman, 2012). Other components of EF that have been shown to be distinctive and important in cognitive control are planning or problem solving (i.e., goal-setting) and mindfulness (Cahn & Polich, 2006). As such, increased functionality of the aforementioned EF components have been linked to increased positive performance across various domains, such as academic achievement (e.g., Best & Miller, 2010; Best et al., 2011), mental health (e.g., Black et al., 2011; Pennington & Ozonoff, 1996), and social awareness (e.g., Bradford et al., 2015).

Similarly, constructs of purpose and meaning have their array of definitions,
explanations, and of course, arguments pertaining to whether the two terms can be used interchangeably. Discussion over this debate will be reviewed further in this paper; nevertheless, both concepts emphasize aspects of an individual living a fulfilling, “meaningful” and “purposeful” life. Some studies have looked at some aspects of EF and meaning/purpose together, specifically, self-regulation. Vohs and Heatherton (2000) found that one’s ability to self-regulate behaviors so that they align with their life goals can be fostered, however, the process often leaves the individual feeling “depleted” or “fatigued” by the demands. Broadly speaking, the process of contemplating one’s meaning in life or whether a person perceives they have some purpose in their life should require the aforementioned EF components, especially planning. Nevertheless, such research examining meaning, purpose, and EF in combination has yet to be conducted. This paper discusses how striving for purpose and/or meaning is essential to human health and well-being, the benefits across the lifespan, and how EF plays a role in such constructs. Additionally, the extent to which EF, purpose, and meaning can be improved by various interventions is also explored.

As a child becomes older, significant brain development occurs, both physically and cognitively. Often, it is assumed that as youth transition from school-aged years into adolescence, adulthood is the next developmental period that is experienced. However, a developmental period between adolescence and adulthood has become apparent in the literature, known as emerging adulthood. Emerging adulthood is considered to be a developmental time period that, as a field in and of itself, is growing exponentially in terms of research breadth and interest, and originally included individuals between the ages of 18 and 25 (Arnett, 2000). Arnett (2000) proposed the term to incorporate individuals that are interested in “relative independence,” though have not yet entered into taking on the responsibilities of adults and fall
between the aforementioned ages (p. 469). More recently, research has supported that emerging adulthood can actually be extended to include individuals between the ages of 18 and 29 (Arnett, 2014b). Arnett (2004, 2014a) utilized qualitative data from 300 interviews with individuals aged 18 to 29 years to develop five features of emerging adulthood. Other researchers have sought to empirically support this theory across various populations, however the research that explores emerging adulthood through a multicultural lens is limited (e.g., Arnett, 2014, 2015; Bundick, 2012; Gonidakis et al., 2018; Luyckx et al., 2006; Zorotovich & Johnson, 2019). Arnett’s features of emerging adulthood include:

- **Identity explorations**: the exploration of a variety of areas, especially in the areas of love and work
- **Instability**: an exploration of various possibilities by frequently making changes in love, work, and living
- **Self-focus**: the notion that emerging adults are focused more on independent decisions than other facets of their life
- **Feeling in between**: the sense that emerging adults are more autonomous than they were during adolescence, but do not believe they are a stable adult just yet
- **Possibilities/optimism**: emerging adults are hopeful for their future and the opportunity to transform their life (2014a).

In a national survey of over 1,000 diverse emerging adults aged 18 to 29 years, known as the Clark Poll, the five features of emerging adults were empirically supported (Arnett, 2014b). Specifically, 77% of emerging adults reported that they were in a time of their life where they were “finding out who [they] really are” (Arnett, 2014b, p. 158). Additionally, 83% agreed that they were at a time where their life was full of changes and 71% felt “selfish,” but added that
they needed to focus on themselves at this particular time in their life. Also, 45% did not believe they were stable adults, and instead described that reliance on their parents kept them from feeling fully self-sufficient. Further, participants indicated that despite being stressed and experiencing anxiety, 89% reported feeling hopeful for the future (Arnett, 2014b). Overall, the five features of emerging adulthood highlight important areas of a developmental period where tremendous self-growth can occur across a range of settings. The focus of this study is on emerging adults in the college environment.

So, what is the importance of emerging adulthood to the areas of EF, purpose, and meaning in one’s life? First, it is important to note that this specific developmental time period falls on the newer side of the research literature, being coined as a term a little over 20 years ago (Arnett, 2000). As such, as a group, emerging adults have not been as thoroughly researched as compared to other widely accepted, broad, developmental periods (e.g., childhood, adolescence, adulthood). The research on emerging adults, specifically, is particularly minimal when considering typical EF skill level among those comprising this developmental cohort. Nevertheless, research on emerging adulthood, specifically, is greatly expanding (see Arnett, 2018 or Tanner & Arnett, 2016). However, despite this growing interest in emerging adults as its own unique, developmental period, variables such as EF, purpose, and meaning have yet to be studied in combination with one another, in this population generally speaking and with specific regard for healthy emerging adults. Much of the current research on emerging adults in relation to EF focuses on people experiencing anxiety (e.g., O’Rourke et al., 2018), diabetes (e.g., Berg et al., 2018), head injuries (e.g., Schwartz et al., 2017), and substance abuse (e.g., Kahn et al., 2018). There is some literature that examines emerging adults’ perspectives on purpose and meaning (e.g., Dezutter et al., 2014; Steger et al., 2009), and there is minimal literature on
typically developing emerging adults and their levels of EF skills. For these reasons, this study focuses on the examination of these concepts (EF, purpose, and meaning in life) considering a sample of typically developing emerging adults (i.e., individuals drawn from a non-clinical, non-medical population). Prior to discussing the methodology of the current study, literature as to EF, purpose, and meaning in life will be summarized.

I.1 Executive Functioning

Executive functioning research is rooted in the field of neuropsychology, specifically with those patients who have experienced frontal lobe damage (Lezak, 1982). Over time, physicians and psychologists have studied individuals with severe difficulties related to cognitive control and self-regulation behaviors as a result of frontal lobe damage. These studies typically involve survivors of motor vehicle accidents, individuals affected by stroke or dementia (including Alzheimer’s Disease), and individuals with other neurocognitive or neurodevelopmental disorders accompanied by damage to the prefrontal cortex (PFC) region (Shimamura, 2000; Suchy, 2009).

EF can be defined and researched in several different manners and varies by the age group involved. Researchers of EF skills in preschool to school-aged children (typically 3-9 years of age) define EF as lower-level processes (e.g., Zelazo & Reznick, 1991). As the child grows, so does their EF capability, which ultimately develops into higher-level processes that generally include the constructs (and/or behaviors) of planning and goal-setting (Black et al., 2011; Miyake et al., 2000; Suchy, 2009). Nevertheless, biological mechanisms among both lower- and higher-level processes are evident that can be related back to EF.

As noted previously, neuroimaging has demonstrated that the parts of the brain that are most active during EF tasks are located within the PFC, however more recent fMRI studies have
shown neural activity in other brain regions (e.g., Kane & Engle, 2002; Roberts et al., 1998; Shimamura, 2000; Suchy, 2009). When focusing solely on the heavily researched PFC, three primary regions are prominent, including the (1) dorsolateral PFC, (2) the superomedial PFC, and (3) the ventral (or inferior) PFC (Shimamura, 2000; Suchy, 2009). The dorsolateral PFC is most associated with working memory, having been evidenced by performance on delayed tasks where individuals with damage to this area show difficulty conceptualizing future or past responding, thus regressing to “[routine]...patterns of speech and behavior” that they were accustomed to exhibiting (Fuster, 2000, p. 130). Other studies examining damage to the dorsolateral PFC found difficulties in “areas of reasoning, organization, planning, and problem solving,” all of which are related to working memory (Suchy, 2009, p. 109). The next important region, the superomedial PFC, encompasses the anterior cingulate gyrus, which is responsible for sustained attention and motivation, as evidenced by difficulty during shifting tasks and evaluative processes (Bush et al., 1999; Luna et al., 2015; MacDonald et al., 2000; Suchy, 2009). The ventral (or inferior) PFC appears to be responsible for inhibition as well as goal-directed behavior and motivation (Rubia et al., 2003; Suchy, 2009; Tremblay & Schultz, 2000). While the three aforementioned primary regions of the PFC are heavily researched in conjunction with one another, it is just one model of physiological mechanisms that are viewed as being responsible for a person’s ability to successfully carry out EF skills.

Another model that is examined in the context of neuropsychological conceptualizations of EF involves the prefrontal-cortex basal-ganglia working-memory (PBWM). This model seeks to explain biologically how goals are developed in the moment. Additionally, the model is also useful in conceptualizing goal maintenance over time, both in the immediate and long-term timeframe (O’Reilly & Frank, 2006). New research utilizing updated fMRI technology, as well
as revised and newly developed EF measures that have been normed on a wide range of populations, is needed to explore the primary regions that include the dorsolateral PFC, the superomedial PFC, and the ventral PFC, as well as the PBWM conceptualization model of EF, with greater effectiveness.

Most neuropsychological research involving EF tasks focuses on the dorsolateral PFC region given its overlap and involvement (directly and indirectly) with the three most commonly researched EF components previously mentioned: inhibition, working memory, and shifting (Shimamura, 2000). This is particularly salient when examining and conceptualizing EF through a multi-factor model. Despite Shimamura’s (2000) detailed multi-factor conceptualization, there are other models of EF that should be understood through a developmental lens.

1.1.1 EF as a Single-Factor Model

Most contemporary EF researchers agree that the complexity of EF models grows with human development, becoming increasingly complex as we age, however the concepts EF encompasses remain highly difficult to organize (Miyake et al., 2000). If looking at the current EF research on young children, a single-factor is identified throughout typically developing preschool-aged and young school-aged children (typically ages 5-6; e.g., Wiebe et al., 2008). One study examined working memory and inhibition in preschool-aged children using a Digit Span task from the Differential Ability Scales (DAS; Elliott, 1990) and the Tower of Hanoi task (Simon, 1975; Welsh et al., 1991), respectively. A significant, particularly high correlation was found between working memory and inhibition, so much so that the researchers posited that a single unitary factor was sufficient to explain EF organization amongst this age group (Wiebe et al., 2008). Working memory and inhibition had little distinction until about the age of 6 years. While girls displayed higher overall values on EF measures than boys, these findings were not
statistically significant. This finding was further supported by a study that concluded that children had difficulty discriminating on certain tasks that involved both working memory and inhibition (Shing et al., 2010). Shing et al. (2010) also concluded that a distinction between working memory and inhibition does not appear to be present until around the age of 9 years, 6 months. Gender differences were not reported in their study.

Arguments for a single-factor model explaining adults’ EF skills are evidenced by PFC activation that precedes activation of other neural processes during EF tasks (Duncan & Miller, 2002). Researchers note that this single cognitive process enhances the prefrontal neurons that follow, including the concept of cognitive control, which is seen through behavior (Desimone & Duncan, 1995). Within this conceptualization, attention and inhibition can be viewed as part of the same unit, where attention precedes inhibition. It is important to mention the one-factor conceptualization of EF as it is empirically supported, though typically it is most useful when researching EF in young children. Moreover, it provides a good basis for EF in general terms. However, the research suggests that EF in adolescents, emerging adults, and adults tends to be exemplified by multi-level models, some explained by multi-factors and some explained through categorical terminology (e.g., Lee et al., 2013; Miyake et al., 2000; Zelazo & Carlson, 2012).

Examining the transition of an individual’s EF conceptualization from young childhood into adolescence sets the foundation for EF’s continued complexity through development.

**I.1.2 EF as “Hot” and “Cool” Processes**

One conceptualization of EF includes a framework that is not necessarily distributed by factors, although it is utilized in child EF research, but even more so, extensively in adolescent EF research. The processes of EF are separated into two components, known as “hot” and “cool” processes (Zelazo & Müller, 2002). “Hot” processes allude to the motivational components of
EF that are malleable – those that require reappraisal and reinforcement, which are commonly located within the orbitofrontal cortex (e.g., Happaney et al., 2004). Impairments in areas responsible for hot EF processes are associated with risky decision-making and limitations in daily life skills (Zelazo & Carlson, 2012). In contrast, “cool” EF processes refer to the more cognitive features that one commonly thinks of when envisioning ways EF is currently measured. For example, the Wisconsin Card Sorting Test (WCST; Kimberg et al., 1997) and the classic Color-Word Stroop task (Stroop, 1935) allude to problem-solving skills that evoke brain activity within the prefrontal cortex, as previously discussed.

The hot and cool EF conceptualization is discussed for its utility during adolescence and its possible extension into emerging adulthood. Some evidence has found that during the transition from childhood to adolescence cool EF processes continue to develop and improve in accuracy with hot EF processes substantially delayed by comparison (e.g., Bunge & Crone, 2009; Prencipe et al., 2011; Zelazo et al., 2010). This is one explanation for increases in risky behavior seeking during adolescence, specifically difficulties in self-control and decision-making (Prencipe et al., 2011). However, application of the hot and cool EF conceptualization to emerging adults has been relatively neglected in the literature, as most of the existing research using hot and cool EF is focused on adolescence. Therefore, given this study’s focus on the developmental period of emerging adulthood, a multi-level factor conceptualization of EF will be discussed in depth.

I.1.3 EF as a Three-Factor Model

The most common conceptualization of EF in adults is a three-factor model that includes inhibition (i.e., the ability to override behavior routines), updating (i.e., working memory), and shifting (i.e., switching between sets of rules or directions) (Friedman et al., 2016; Karr et al.,
2018; Miyake & Friedman, 2012). These three components have also been most closely associated with neuropsychological testing research as well as neural imaging (Karr et al., 2018; Miyake & Friedman, 2012; Suchy, 2009). Confirmatory factor analysis (CFA) supports this three-factor model, despite the considerable correlations between the three factors (inhibition, updating, and shifting) making it difficult to discriminate between each factor’s unique utility ($r_s > .40$) (Miyake et al., 2000). Friedman et al. (2016) also found similar results confirming a three-factor model among twin participants at two different time periods (aged 17 and 23 years). Additionally, Roye’s (2020) dissertation work supported a three-factor model of executive functioning among individuals who reported both internalizing and externalizing psychological symptoms.

When applying this conceptualization of EF to age groups other than adults, support for a three-factor model has also been evident in children as young as preschool-age (ages 4-6), though not significantly greater than the single-factor conceptualization of EF that is usually applied to this specific age group (e.g., Monette et al., 2011; Weibe et al., 2008). Additionally, researchers have confirmed its utility with older school-aged children as well as young adolescents (ages 6-12 years; e.g., Agostino et al., 2010; Arán-Filippetti, 2013; Duan et al., 2010; Rose et al., 2012). However, when considering the brain’s room for growth and maturity over time, it is understandable as to why a single-factor conceptualization for EF would be best conceived as a single-factor for young children, gradually developing into a more complex system of performance as they age. To further support this notion, one study examined the point at which working memory and inhibition factors separated. It was evident that working memory and inhibition were crystalized and maintained as a single factor until around the age of 9.5 years old. In other words, working memory mimicked the manner inhibitory behaviors are executed
(e.g., these children are able to remember that they are/are not supposed to do something in accordance with the given rule and thus, do/do not implement certain behaviors). However, between the years of 9.5-14.5 years of age (holding for individual differences), these two constructs (working memory and inhibition) evolve and form an additional factor, hypothesized to be related to recruitment of other neural processes that help to achieve task efficiency (Shing et al., 2010). With respect to previous research and basic description given by the authors, this other factor can be assumed to be shifting, further supporting a three-factor model of EF.

Identifying contexts where EF abilities can have a vital impact on an individual’s life satisfaction and well-being is crucial to understanding and utilizing interventions that can facilitate optimal EF performance. One of these contexts is goal setting. When an individual can set goals and determine what behavior is warranted to move towards said goals, they are ultimately moving towards something of value in their life. Increased adaptive, goal-directed behavior that is planned, organized, and then executed helps facilitate feelings of personal success (Pluck et al., 2020). Additionally, goal-directed behaviors are more easily accomplished with increased executive functioning capabilities, even in smaller, day-to-day activities and occupations, such as sales (Pluck et al., 2020). As such, increased executive functioning skills may facilitate the identification of not only smaller-scale daily goals, but also valued larger-scale long-term goals.

When looking at goal setting throughout adolescence and emerging adulthood specifically, Bronk et al. (2009) asserted that adolescents and emerging adults are greatly concerned with identification of goals and only have to have the belief that such goals can be obtained in order to perceive purpose in their lives. Further, adolescents and emerging adults do not need to know how they will obtain their set goals, just that they have the opportunities and
will to move towards them eventually (Bronk et al., 2009). As they transition to adulthood, it is then that the physical act of adjusting behaviors, inhibiting behavior, and reflecting on the rationale for behavioral changes begin to occur (Bronk et al., 2009). These goals may encompass or facilitate an end point that is beyond the self, also serving as a source of meaning and purpose in their life, be it creative, moral, or spiritual in nature (Damon et al., 2003). Being aware of the utility EF has in an individual’s ability to ponder, consider, and identify possible purpose during adolescence and emerging adulthood, plays a significant role in adaptive behavioral reflection and adjustment towards greater, long-term, valued goals (i.e., one’s purpose in life). *Purpose* will be discussed in greater detail in a subsequent section of this paper.

**I.1.4 Self-Regulation**

Considering the multiple factors that go into a full conceptualization of EF, it is important to understand self-regulation and how it presents in adolescence and evolves into emerging adulthood. Self-regulation is a broad concept operationally defined via multiple means, techniques, and languages over the years. The most well-known theories of self-regulation in adults are usually associated with skills relevant to treating substance use and addiction (Carey et al., 2004). In adolescent and emerging adult populations, self-regulation, or the lack thereof, is usually coupled with “risky behaviors” such as reckless driving, unsafe sex, and substance abuse (Olson et al., 2007). On a neurocognitive level, brain development has an important impact on self-regulation during adolescence, however, for the purposes of this paper, neurocognitive perspectives will not be covered (for reviews see Rodrigo et al., 2014; Steinberg, 2007; or Tang et al., 2014). For youth, higher levels of self-regulation are associated with increasingly positive behavior in the classroom, higher academic achievement, and fewer internalizing and externalizing behavioral issues (Eisenberg et al., 2001; Olson et al., 2007).
Yet, even with conceptualizations of self-regulation as an independent dynamic, it cannot be discussed without addressing it as a facet of an individual’s overall executive functioning. Even with this extension, executive functioning can also be defined in multiple ways depending on the researcher’s theoretical orientation and field of practice, which can foster entirely new papers aside from the current one (see Rothbart & Posner, 2005). However, longitudinal research focusing on self-regulation, spanning over 32 years, has shown self-regulation’s ability to predict (as a gradient) various aspects of an individual’s growth and betterment, including physical health, substance dependence, socioeconomic status (SES), and criminal consistency (Moffitt et al., 2011). When considering self-regulation and its relationship to EF, a positive correlation is seen between age and self-regulatory abilities, meaning as children grow into adulthood, so do their capabilities to regulate emotions and behaviors (Moffitt et al., 2011). The inclusion of self-regulation in the comprehensive EF framework is not only important to examine but can be argued as being quite necessary.

1.2 Purpose

In recent decades, both meaning and purpose have risen to scientific prominence, much of this having to do with the significant impact and influence of the work of such luminaries as Viktor Frankl (Frankl, 1959/1985). When considering purpose and meaning specifically, many individuals have used the two terms interchangeably. However, contemporary, research-driven conceptualizations delineate the terms meaning and purpose as related, albeit distinctly different, concepts (e.g., Bronk & Mangan, 2016; Damon et al., 2003; George & Park, 2014; Heintzelman & King, 2014; Morgan & Farsides, 2009). Meaning has numerous definitions, one of which relates to having a sense of one’s significance in the world, that one’s existence means something (Steger et al., 2006). Further, research has demonstrated that meaning can be measured in a
variety of ways, with one distinction being presence of meaning in comparison to search for meaning (Heintzelman & King, 2014; Morgan & Farsides, 2009; Steger et al., 2006). The former phrase relates to how much meaning a person perceives, while the latter refers to one’s motivation to quest for meaning.

Regarding purpose, Damon et al. (2003) defined it as “a stable and generalized intention to accomplish something that is at once meaningful to the self and of consequence to the world beyond-the-self” (p. 121). This is also consistent with, and stems from, Frankl’s illustration of self-transcendence that asserts that humans strive for more than the current state of their life and is the “essence of existence” (Frankl, 1962, p. 95). This particular purpose facet, highlighted by Frankl (1962) and explored further by Damon et al. (2003), often includes behavioral repertories that facilitate a sense of doing something or feeling something that is “beyond-the-self.” When exploring current conceptualizations of meaning, self-transcendence is not typically captured as a distinct component, suggesting that measurements of purpose that incorporate meaning are important to utilize in ongoing research (Bronk et al., 2009). Bronk and Mangan’s (2016) more recent conceptualization and assessment of purpose incorporates a beyond-the-self orientation as well as “valued, overarching goals” that help individuals to move towards deeper fulfillment in their lives (Kosine et al., 2008). Nevertheless, while there are distinctions between meaning and purpose, the two concepts are closely related (Bronk & Mangan, 2016; George & Park, 2014).

When focusing on adolescence specifically, research shows that this age group better understands the term purpose as opposed to meaning (Bronk & Mangan, 2016). Specifically, one in five adolescents report having a clear purpose in life, though more research is needed to explore the trajectory as to when the distinguishing between purpose and meaning occurs (Damon, 2008). As such, this would contribute to examining how emerging adults understand
both *purpose* and *meaning* distinctively as well. As *purpose* incorporates more goal-directed behaviors as well as a beyond-the-self component, the facilitation of movement towards goals is particularly important as an individual transitions from adolescence into emerging adulthood. Because of this, conceptualizations of *purpose* are utilized and focused on with greater prominence in comparison to *meaning* throughout this paper, given purpose’s significant focus and incorporation of goal-directed behaviors.

Development of purpose is related to Erikson’s (1968) stage theory that incorporates identity formation (Bronk, 2011). Individuals that lack a “healthy identity” as they develop may struggle with determining a purpose or direction in their life (Bronk, 2011, p. 31). This uncertainty may account for decisions involving unhealthy behavioral choices, including issues with aggression, substance abuse, and in general, self-regulation. At the same time, the struggle to determine purpose may be related to difficulty in goal identification, and goal-setting that would be used as motivation for goal-directed behaviors later in life (Bronk et al., 2009).

Experiencing difficulty with identifying purpose, or perceiving little or no purpose in one’s life, is correlated with such factors as boredom, depression, anxiety, hopelessness, suicidal ideation, and substance abuse (Bronk & Mangan, 2016). Alternatively, purpose is positively correlated with life span and better overall health, both physically and psychologically. A recent study by Chen and Cheng (2020) found that an increase in purpose across two years was associated with enhanced life satisfaction as well as fewer reported symptoms of depression among Taiwanese high school adolescents. Other studies have found additional benefits of increased purpose among adolescents across various ethnicities and cultures, including increased academic success, self-efficacy, grit, resiliency, and maintenance of an internal locus of control (Bronk & Mangan, 2016; DuRant et al., 1995; Hill et al., 2010; Rathi & Rastogi, 2007). Despite
these broad findings, it is important to note that most, but not all, of these studies’ participants are from middle socioeconomic status (SES) backgrounds where parent involvement is more often seen, than not. Additionally, parent involvement typically acts as a protective factor for adolescents as well as young emerging adults, even when controlling for ethnicity and SES (Chen & Gregory, 2009).

Among the complete age range that emerging adulthood encapsulates (18-29 years specifically), the benefits of increased purpose among diverse ethnic, cultural, and socioeconomic backgrounds remains minimal (e.g., Bundick, 2012; Hill et al., 2016). However, when considering the breath of research that utilizes college student samples, the utility of purpose among the emerging adults in college is substantial. Continued research is needed to identify how purpose can be fostered effectively with emerging adults, across settings, and with consideration of different cultures and values. Nevertheless, the research on purpose among diverse emerging adults that fall into this discrete developmental period that live varied lifestyles (e.g., college students, in the work force, trade school, etc.) is expanding (e.g., Bronk et al., 2020; Chen & Cheng, 2020; Gutowski et al., 2018; Ratner et al., 2020; Yuliawati & Ardyan, 2020).

The current study aimed to assess the utility and necessity of purpose amongst emerging adults in the college context, specifically, as college tends to be a time of self-reflection and long-term goal-setting.

As aforementioned, research examining emerging adults’ conceptualization of purpose in life is growing in popularity and focus, as the benefits from having a perceived purpose in life continues to be validated as an essential source of health and well-being. For example, emerging adults participating in “reflection and deep thought about [their] purpose in life” in a casual setting reported greater life satisfaction and goal directedness (Bundick, 2012, p. 93; Martela &
Steger, 2016). Additionally, in a study of approximately 500 emerging adults purpose scores obtained via a brief measure were correlated with an increasingly positive self-image, decreasing the likelihood for two common issues seen in individuals engaging in delinquent behaviors, namely rule-breaking and substance use (Hill et al., 2016). The importance of developing purpose in one’s life extends across multiple developmental periods. This process would be highly beneficial as research has shown that greater life satisfaction and overall well-being is higher when such perceptions of purpose exist, resulting in increasingly positive attributions in one’s life.

Fostering purpose among adolescents and emerging adults is necessary but requires time and resources. However, it is quite feasible when adequate discussion, attention, and social support (e.g., community involvement, resources, volunteerism) is given to the topic (Bronk et al., 2009; Rockenbach et al., 2014). Additionally, the long-term benefits previously mentioned, including an increasingly positive self-concept, improved well-being, and overall physical health, should be highlighted when interventions are considered. Research on the development of purpose during adolescence is promising, with results indicating that purpose is beneficial to adolescents’ overall health and well-being (Bronk & Mangan, 2016). Among emerging adults, both search and presence of meaning in life is associated with overall well-being later in life, and specifically, psychological well-being (Krok, 2018; Steger et al., 2008; Steger et al., 2009). This is important to note, as emerging adulthood is a developmental phase of life when individuals are developing personal and social identities to significantly greater degrees. To a much larger extent than adolescents, emerging adults organize and identify experiences from both their past and present as meaningful events that will impact their future goals and views of the world (Dezutter et al., 2014). Aiding emerging adults through the fostering of purpose in this way can help them
to decipher their experiences and integrate past experiences into their lives as they move forward into their respective futures.

When examining self-regulation’s relationship to purpose, there is some evidence that overlap or at least, a relationship, between both concepts exists. As aforementioned, purpose can be fostered when a person examines their personal life goals, recognizing the goals that are of the greatest value, helping to propel them towards a life where they feel fulfilled (Kosine et al., 2008). Self-regulation theory postulates that in order to attain goals, one must identify specific goals, plan on how to accomplish such goals, and then set in motion the steps to execute the plan that was outlined (Kruglanski et al., 2000). In order to plan and achieve goals, it seems apparent that adequate self-regulation abilities are a necessity. Along these lines, Linver et al. (2018) established a significant connection between intentional self-regulation (ISR) and purpose in life among adolescents participating in a developmental program. High levels of self-regulation were associated with greater purpose in life, and together, better overall mental health. In another study, Vazeou-Nieuwenhuis et al. (2017) found that purpose mediated an individual’s ability to execute steps outlined in achieving set goals as well as overall life satisfaction. While these results are promising, it is concerning that research involving emerging adults and self-regulatory skills is difficult to find, pointing to a need to examine such areas in this population. Thus, the current study further examines the role self-regulation may play in both EF skills and the fostering of purpose in life in a sample of emerging adults.

1.3 Present Study

The purpose of this study was to examine whether EF skills have a statistically significant relationship to purpose in life among the emerging adult population. Upon extensive review, no studies were found that explore EF and purpose in life in relation to one another. Further, this
study examined whether and to what extent objective and self-report measures of EF capabilities were related to reported levels of purpose in life. Given the extensive, but separate, respective research literatures on EF and purpose in life, it seems apparent that some statistically significant relations exist yet remain to be documented. Such an assertion is based on the potential overlap in terms of goal-directed behaviors, self-regulatory processes or inhibition, and the need to continuously update goals within certain contexts. This study generated neuropsychological research in tandem with important elements within the growing research on purpose in life among emerging adults.

The goal of this study was to explore perceived purpose in life among emerging adults in college and examine if any relationship with an individual’s EF capabilities exists. Purpose is especially important throughout emerging adulthood for organizing life goals and making the conscious decision to engage in behaviors consistent with those goals. Additionally, research has shown that during emerging adulthood, individuals search for both purpose and meaning in their respective lives, perhaps more prominently than in other life stages (Bronk et al., 2009). Moreover, between meaning and purpose, emerging adults tend to identify and report searching for purpose specifically, as opposed to meaning in life in a larger sense per se (Bronk et al., 2009). These same emerging adults also reported greater life satisfaction whether searching for purpose or whether they were able to identify significant purpose in their lives (Bronk et al., 2009). The development and fostering of purpose encompasses goal-directed behavior and valued intention (Bronk et al., 2020), which are key aspects of various EF skills measurable through either formal or informal assessment. Because of such findings, this study places greater emphasis on purpose, while still aiming to value the role meaning holds. To ensure that meaning is not overlooked or discounted, the Claremont Purpose Scale (CPS) was used as the primary
measure of purpose as the CPS contains items that relate to meaning (i.e., a subscale). Moreover, a commonly used measure of meaning (the Meaning in Life Questionnaire, or MLQ) was included in the study to examine potential overlap between purpose and meaning, thus extending the research base to illuminate our understanding of these concepts in emerging adults.

As discussed, the three-factor conceptualization of EF (inhibition, updating, and shifting; Friedman, 2016; Miyake & Friedman, 2012) was the framework utilized in this study. Executive functioning was measured both objectively and subjectively utilizing the self-report measure, Barkley Deficits in Executive Functioning Scale, Short Form (BDEFS-SF) as well as the neuropsychological set of tests, the Delis-Kaplan Executive Functioning System (D-KEFS). The potential for overlap between EF and purpose is anticipated in terms of behavioral repertoires and thus, considered to relate to the three-factor model as such. First, EF entails self-regulation or self-control, which can be interpreted as Miyake and Friedman’s (2012) inhibition component, which is also needed to focus on goals set in fostering purpose. Next, in order to foster and strive for purpose, individuals must be able to contemplate their behaviors in the moment and problem solve accordingly, which demonstrates the updating component of Miyake and Friedman’s (2012) conceptualization.

Lastly, while individuals can set goals, prioritize these goals, reflect on past experiences, and plan for their future based on life experiences they perceive to be important, updating their behaviors to adjust for changes is essential, and thus, purpose should be related to the shifting component of Miyake and Friedman’s (2012) model of EF. On behavioral principles alone, the three-factor conceptualization of EF skills has the most promise as a potentially useful framework for this study. However, no empirical research has been conducted to support this assertion, necessitating the current study. Establishing a relationship between EF and purpose in
life among emerging adults will highlight the indirect influence each concept has on the other, in the context of a critical developmental period. As such, the broader fields of neuropsychology and positive psychology can be further researched in tandem and help facilitate essential goal-directed behavior. Furthermore, this study focused specifically on executive functioning and purpose in life among emerging adults that are currently attending college.

I.4 Hypotheses

I.4.1 Relationships between EF and purpose in life

- H1A: Lower levels of overall self-reported deficits in EF skills will be correlated with higher levels of overall self-reported purpose in life among emerging adults in college.
- H1B: Objective measures of EF will predict higher levels of overall self-reported purpose in life among emerging adults.
  a. Participants with higher scores on a measure of inhibition ability will report higher levels of purpose in life.
  b. Participants with higher scores on a measure of updating ability will report higher levels of purpose in life.
  c. Participants with higher scores on a measure of shifting ability will report higher levels of purpose in life.

I.4.2 Relationship between self-regulation and purpose in life

- H2: Higher levels of overall self-reported self-regulatory abilities will be correlated with higher overall self-reported levels of purpose in life scores among emerging adults.

I.4.3 Relationship between self-regulation and the EF skill inhibition

- H3: Higher levels of overall self-reported self-regulatory abilities will be correlated with higher scores on an objective measure of inhibitory skill.
I.4.4 Relationship between purpose in life and the presence of meaning in life

• H4: High levels of overall purpose in life will be correlated with higher levels of presence of meaning in life.
II.1 Participants

Participants were recruited from the University of Mississippi’s affiliated SONA research system. Participants either received required research participation credit as a part of their class or alternatively course extra credit. Inclusion criteria for participation were based on Arnett’s (2014a) description of emerging adulthood, where individuals had to acknowledge that they were between the ages of 18 and 29 years old. Emerging adults were specifically chosen for this study for a few reasons: (1) many college students fall within this specific age range, (2) Arnett (2014a) found that individuals within this age range are hesitant to identify as a stable adult due to high levels of dependence on their family during college, and (3) emerging adulthood is a growing area of research across multiple salient contexts. Obtaining crucial information on EF and perceived purpose in life among emerging adults at a large university located in the southern United States would be a valuable contribution to the recent research involving this specific developmental period. Eligible participants responded to the online portion of the survey and were asked to attend an in-person assessment session with one of the study’s researchers afterward. Informed consent was provided to participants initially prior to the online administration of the self-report measures. Informed consent was again provided prior to the invitation to complete the in-person testing portion. Informed consent was provided on two occasions to ensure the understanding of testing procedures and the storing of protocols (see Appendix A).
II.2 Measures

II.2.1 Demographic Information (Appendix B)

Each participant completed a demographic survey with respect to age, gender identity, race/ethnicity, hometown, sexual orientation, religious/spirituality level of importance, employment status, previous developmental diagnoses (e.g., attention-deficit/hyperactivity disorder [ADHD]), and current living situation. Basic demographics including age, gender identity, and race/ethnicity, as well as employment status and living situations, were included in the analyses as they directly pertain to previous studies of EF and perceived purpose in life. Because the purpose of the current study lies in exploring possible relationships between executive functioning and purpose in life, participants that chose to report developmental diagnoses, such as ADHD, were not included in the primary statistical analyses. These data were retained for secondary analyses, however. Similarly, other demographic information obtained, such as sexual orientation, hometown, religious/spirituality level of importance, were also retained, albeit for use in future analyses that are not within the scope of the current study.

II.2.2 Executive Functioning Measures

Executive functioning was measured via objective means through multiple standardized tasks congruent with Miyake et al.’s (2000) and Miyake and Friedman’s (2012) three-factor EF model. Specific tasks administered were geared toward the assessment of inhibition, updating, and shifting as shown through Latzman and Markon’s (2010) factor analysis of the Delis-Kaplan Executive Functioning System (D-KEFS). In addition to objective measures, a subjective measure of EF was administered via a self-report of participants’ perceived EF level.

II.2.2A Delis-Kaplan Executive Functioning System (D-KEFS). The D-KEFS was developed by Delis, Kaplan, and Kramer (2001a) to assess EF through well-validated subtests
identified in the literature as components of EF. The D-KEFS sample was normed and standardized across 16 age groups (1,759 children and adults), applicable to individuals between 8 and 89 years of age. The D-KEFS is one of the most widely used neuropsychological assessments administered to measure EF, through the inclusion of both verbal and nonverbal tasks. Delis et al. (2001a) identified nine tasks as having sensitivity to frontal lobe functioning that have proven vital in assessing EF. As aforementioned, Latzman and Markon (2010) identified three subtests, one subtest each to represent each aspect Miyake et al.’s (2000) three-factor model of EF (inhibition, updating, and shifting), across three age groups ranging from 8 to 89 years old ($N = 1,389$). The three D-KEFS subtests that best fit the three-factor model are the Color-Word Interference Test: Inhibition task (inhibition; estimate for the best-fitting model = .72), the Verbal Fluency Test: Category Switching task (updating; estimate for the best-fitting model = .90), and the Sorting Test (shifting; estimate for the best-fitting model = .96). These subtests are discussed in greater detail below. While the D-KEFS is typically used with populations that have severe brain damage or suspected cognitive difficulties due to wide-ranging etiologies, it has been utilized extensively in research with healthy individuals as well as community samples (Karr et al., 2018). These latter samples tend to demonstrate more variability among tasks in comparison to populations with a range of cognitive impairments (e.g., patients with frontal lobe damage; Karr et al., 2018).

**II.2.2A.i Color-Word Interference Test: Inhibition Task.** The D-KEFS’ Color-Word Interference Test is similar to the original Stroop (1935) method where individuals name a series of ink colors that are printed in various hues. For example, reading the word “red” that is presented in blue ink. This task is considered an “overlearned verbal response” as reading words instead of naming ink colors produces a need for inhibitory behaviors (Swanson, 2005, p. 121).
Despite the widespread use and popularity of the classic Stroop method, the D-KEFS offers four versions of this task: (1) naming the color; (2) reading the color words; (3) naming the ink color and not reading the word; and (4) switching between reading the ink color and reading the color word. An inhibition score is generated across the four conditions. The needed ability to execute each condition is consistent with Miyake et al.’s (2000) finding regarding the Stroop Test that an “override” is necessary in order for a participant to accurately perform the task (p. 57).

**II.2.2A.ii Verbal Fluency Test: Category Switching Task.** The D-KEFS’ Verbal Fluency Test prompts the individual to generate words fluently in an “effortful phonemic format” across different concepts (Swanson, 2005, p. 122). The Switching Test portion has the individual switch between two different categories and a switching total score is generated. For example, the individual must switch between naming food items and modes of transportation. While it appears this task would represent a shifting factor of EF, it has been shown to be more closely related to updating, a component of working memory. This is most likely due to the higher level of cognitive flexibility needed to successfully switch between the two categories. While this is not consistent with Miyake et al.’s (2000) findings for updating, verbal fluency tasks have been associated with the lateral portion of the prefrontal cortex, which is consistent with other working memory tasks (Hirshorn & Thompson-Schill, 2006; Latzman & Markon, 2010).

**II.2.2A.iii Sorting Test.** This task was previously known as the California Card Sorting Test (CCST) and was developed by Delis (Delis, 1988, as cited in Delis et al., 2001b). It requires the individual to sort and describe a set of cards based on different characteristics including shape, color, writing or word meaning (Delis et al., 2001a). Next, the individual has to identify how the examiner sorted the set of cards. Because the individual has to switch between numerous tasks and is then given a new instruction as interference, “shifting mental sets” including
problem-solving skills and flexible thinking skills are needed (Latzman & Markon, 2010). Additionally, this task is meant to “sensitive to initiation of problem-solving behavior, verbal, and nonverbal concept formation skills, transfer of concepts into action, flexibility of thinking, and flexibility of behavior response” (McFarland, 2020, p. 1). This task is also consistent with Miyake et al.’s (2000) proposal for the shifting factor.

**II.2.2A.iv D-KEFS Reliability and Validity.** The *D-KEFS Technical Manual* (Delis et al., 2001c) presents the various internal consistency coefficients, test-retest reliabilities, and standard errors of each subtest of the D-KEFS. Specific validity support for each task is also reported in the *D-KEFS Technical Manual* (Delis et al., 2001c). Discriminant validity has been established across all nine subtests, including the three tasks discussed above. Swanson (2005) reported low positive correlations between each individual subtest demonstrating the uniqueness of each task. As such, Swanson (2005) adds that each subtest should be interpreted separately and individually.

Because the development of the D-KEFS took approximately 10 years, it was recommended that studies continue to examine the subtests individually in an effort to provide updated psychometric support (Delis et al., 2004). Since its development and validation, the D-KEFS has been used in numerous studies, adding to its foundation of psychometric support (e.g., Erdodi, Hurtubise, et al., 2018; Erdodi, Sagar, et al., 2018; Karr et al., 2020). Recently, McFarland (2020) utilized orthogonal modeling to assess the D-KEFS’ nine subtests and evaluation of Delis et al.’s (2004) seven-factor model fit. Results of the exploratory factor-analytic modeling used in the study confirmed a seven-factor model and highlighted the complexity of the determinants of D-KEFS test scoring. As such, individual test interpretation was recommended as in other research findings (McFarland, 2020).
II.2.2B Barkley Deficits in Executive Functioning Scale, Short Form (BDEFS-SF; Appendix C). The BDEFS-SF was developed by Barkley (2011) to examine behavioral difficulties an individual may be experiencing in relation to their EF abilities. It is a 20-item self-report measure, a shortened-version of the original 89-item measure, the Barkley Deficits in Executive Functioning Scale (BDEFS), or the Barkley Deficits in Executive Functioning Scale, Long Form (BDEFS-LF). Both the BDEFS-SF and the BDEFS-LF prompt the individual to rate items based on their behaviors over the last 6 months. Items are scored via a 4-point Likert-type scale that ranges from Never or rarely (1) to Very often (4) (Barkley, 2011). Additionally, both forms assess EF across five domains: Self-Management to Time, Self-Organization/Problem-Solving, Self-Restraint, Self-Motivation, and Self-Regulation of Emotion. Each subscale is comprised of four items. Self-Management to Time relates to an individual’s tendencies to procrastinate, forget, or have difficulties with time-managing skills (e.g., “Procrastinate or put off doing things until the last minute”). Self-Organization/Problem-Solving evaluates one’s ability to process information, including how accurately and quickly they can learn information, as well as their abilities to problem-solve (e.g., “Have trouble learning new or complex activities as well as others”). Self-Restraint examines impulsivity, frustration tolerance, and one’s ability to inhibit their behaviors in consideration of future consequences (e.g., “Make impulsive comments to others”). Self-Motivation examines an individual’s ability to work towards long- and short-term goals, work without supervision, and put forth consistent effort (e.g., “Others tell me I am lazy and unmotivated”). Lastly, Self-Regulation of Emotion evaluates one’s ability to self-soothe, control emotional reactions, and perceive events from an unbiased view (e.g., “Have trouble calming myself down once I am emotionally upset”; Barkley, 2011). Items on each subscale are tallied to derive a subscale score, and subscale scores are summed to arrive at a total
score, where higher scores indicate increasingly severe deficits in overall EF abilities. Additionally, items that are given a score of 3 or 4 may be tallied to obtain an Executive Functioning Symptom Count (Barkley, 2011). All scores (subscales, total score, and symptom count) can be computed into percentile ranks based on age and gender through use of the tables provided in the BDEFS manual (Barkley, 2011). Both the BDEFS-SF and the BDEFS-LF have a self-report version for use as well as an other-report version. In the current study, the BDEFS-SF: Self-Report was the version of the measure administered, with the total score (the sum of all subscale scores) utilized for statistical analyses (as establishing an initial relationship between EF and purpose was the main goal of the study).

**II.2.2B.i BDEFS-SF Reliability and Validity.** The BDEFS-LF was finalized following factor analysis of its 100-item prototype version, resulting in five subscales, with 12 items per subscale, 89 items in total (Barkley, 2011). Each item of the five subscales had a factor loading of at least .400 after varimax rotation and .500 after promax rotation. Each subscale accounted for a minimum of 2.5% of the variance, yielding a 53.2% total variance explained by the five factors (Barkley, 2011). The BDEFS-SF was then constructed by utilizing the four highest loading items from each of the five “parent” subscales of the BDEFS-LF, totaling 20 items. The internal consistency reliability of the BDEFS-SF was calculated to be .92 and the correlation of the BDEFS-SF with the BDEFS-LF was found to be statistically significant ($r = .97, p < .001$; Barkley, 2011). The original study reports internal validity (the degree to which the study was able to provide sound results for what it set out to measure and generate cause-and-effect conclusions) for the BDEFS-LF. As such, Sheble (2018) found the BDEFS-SF to have good internal consistency ($\alpha = .87$). This result was supported by a Keiser Meyer Olin Test of Sampling Adequacy (KMO), a statistic that suggests adequate sampling with a value of .80 or
above. Sheble (2018) reported a KMO value for the BDEFS-SF validation study of .85, thus supporting the study’s sample to be adequate and other statistics to be sound. Additionally, Sheble (2018) found a statistically significant Bartlett’s Test of Sphericity (Bartlett’s Test) leading the researcher to support the BDEFS-SF as a valid and reliable alternative to the BDEFS-LF.

More recently, the BDEFS-LF was validated using exploratory structural equation modeling (ESEM) and confirmatory factor analysis (CFA) in a nonclinical college student sample to aid in the identification of at-risk college students with significant EF deficits (Kamradt et al., 2021). The study consisted of 1,311 participants and yielded a five-factor model as originally proposed by Barkley (2011), utilizing both the BDEFS-LF and BDEFS-SF (Kamradt et al., 2021). Due to the statistically significant, high correlation between the two versions, the BDEFS-SF’s specific utility for use with college students was supported.

**II.2.3 Self-Regulation Measure**

Self-regulation was measured during the course of the study as research has demonstrated a significant relationship between self-regulation and EF. Examination of self-regulation in the present study allowed for a better understanding of the potential role it may play in the development of EF (as well as purpose in life).

**II.2.3A Short Self-Regulation Questionnaire (SSRQ; Appendix D).** Brown et al. (1999) originally developed the Self-Regulation Questionnaire (SRQ) as a 63-item measure examining seven dimensions of self-regulation, as outlined by Miller and Brown (1991), in a substance use population. Carey et al. (2004) developed a 31-item shortened version of the SRQ, the Short Self-Regulation Questionnaire (SSRQ), which was normed with 391 undergraduate students. Items are scored on a 5-point Likert-type scale ranging from strongly disagree (1) to
strongly agree (5). Items were designed to measure an individual’s general capacity to behaviorally self-regulate. Example items include “I give up quickly” and “I put off making decisions.” Items are summed to derive a total score where higher scores indicate better individual ability to self-regulate (Carey et al., 2004). Neal and Carey (2005) found a two-factor model for the SSRQ (i.e., impulsive control and goal setting) that evidenced acceptable reliability and totaled 21 items. However, only one other study, one focusing on the Portuguese version of the SSRQ, found evidence for a similar two-factor model (García del Castillo & Dias, 2009).

In addition to a Portuguese version, the SSRQ has been translated and validated in numerous other languages, such as Spanish and Chinese (e.g., Chen & Lin, 2018; Garzón Umerenko et al., 2017). It has also been used in many different contexts outside of Western culture, including South African contexts (e.g., Potgieter & Botha, 2009; Vosloo et al., 2013), Brazilian Portuguese contexts (Almeida & Behlau, 2017), and Central and Eastern European contexts (Šebeňa et al., 2018). In each of these studies, factor analyses were conducted, yielding best fit models ranging from four to seven factors. For the purposes of the current study, the total sum score of the SSRQ was utilized in statistical analyses as it has psychometrically sound properties among a college student sample. Future analyses of the data could include examination of the SSRQ subscales, possibly confirming a best-fit multifactor model among this particular population.

II.2.3A.i SSRQ Reliability and Validity. In a psychometric analysis of the SRQ, Carey et al. (2004) also analyzed the SSRQ, finding a significant positive correlation between the two measures among college students ($r = .96$). Results indicated a single factor model representing overall self-regulation ability that accounted for 43% of the variance. In the same study, good
internal consistency reliability was also reported for SSRQ scores ($\alpha = .92$). To examine
discriminant validity of SSRQ scores, Carey et al. (2004) examined the relationship between the
SSRQ and the Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960),
finding moderate support by way of a statistically significant positive correlation ($r = .47$, $p <
.0001$). While this relationship poses some concern, the researchers indicated that only a portion
of the variance might be attributed to social desirability. Moreover, they indicated that the
positive correlation of the SSRQ with social desirability responses on the MCSDS is not
unreasonable as the sample included college students, and that “the trait social desirability
covaries with self-regulation abilities” (Carey et al., 2004, p. 258). While the assessment of
social desirability was not part of the current study, the SSRQ’s utility as a measure of basic self-
regulation among a college student population is supported given the aforementioned
psychometric findings.

II.2.4 Purpose and Meaning Measures

Purpose was assessed with a newly developed self-report measure, though one with excellent initial and promising psychometric properties. While other measures of purpose are available, most have been normed on adults and more extensively, older adults. Because the following measure was developed and normed on adolescents, further validation studies have recently been conducted with samples of college students. These findings have shown the instrument to have sound psychometric properties, and as it assesses multiple aspects of purpose, it was determined to be most appropriate for the emerging adult respondents in this study (see, for instance, Pavlacic, 2019; Veazey et al., 2020; Weber, 2021).

II.2.4A Claremont Purpose Scale (CPS; Appendix E). The Claremont Purpose Scale (CPS) is a 12-item self-report measure of three distinct dimensions of purpose: Goal-
Directedness, Personal Meaning, and self-transcendence or Beyond-the-Self (Bronk et al., 2018). Looking at the subscales specifically, Goal-Directedness measures the extent respondents engage in behavior that is consistent with their goals (e.g., “How hard are you working to make your goals a reality?”). Next, Personal Meaning assesses an individual’s perception of how meaningful or significant their life is perceived to be (e.g., “How clear is your sense of purpose in life?”). Finally, Beyond-the-Self measures the level of importance of making an impact in the world and encompasses empathetic concern (e.g., “How important is it to you to make the world a better place in some way?”; Bronk et al., 2018). Each of the three aforementioned dimensions of purpose consists of four items scored on a 5-point Likert-type scale. Responses are summed per subscale with total subscale scores ranging from 4 to 20. Subscale scores are also summed to produce a total score ranging from 12 to 60. Subscale scores indicate where perceived purpose tends to be demonstrated and where further support may be needed to foster purpose (Bronk et al., 2018). Higher total scores indicate greater self-perceived purpose in life. While the CPS was initially developed for use with adolescents, recent normative data reported for emerging adults supports the CPS’ use with this population (Weber, 2021).

With respect to mean scores, adolescents tend to average within the moderate range of overall purpose in life ($M = 3.50, SD = .77$). Examining the subscales separately, adolescents also tend to report scores in the moderate range: Goal-Directedness ($M = 3.50, SD = .81$), Personal Meaning ($M = 3.32, SD = 1.01$), and Beyond-the-Self ($M = 3.68, SD = .96$; Bronk et al., 2018). Among emerging adults, higher mean scores have been found for overall purpose ($M = 44.80, SD = 7.48$) as well as with respect to each subscale: Goal-Directedness ($M = 15.58, SD = 2.74$), Personal Meaning ($M = 13.19, SD = 3.86$), and Beyond-the-Self ($M = 16.01, SD = 3.19$);
Weber, 2021). As emerging adults are older and likely have more varied life experiences, it follows that scores would be higher than the scores from Bronk et al.’s (2018) adolescent participants.

**II.2.4A.i CPS Reliability and Validity.** While still relatively new, the CPS has demonstrated sound psychometric utility with excellent overall internal consistency reliability ($\alpha = .93$). When examining the subscale dimensions separately, very good internal consistency was also demonstrated: Goal-Directedness ($\alpha = .92$), Personal Meaning ($\alpha = .86$), and Beyond-the-Self ($\alpha = .92$). In the initial developmental research, CPS scores demonstrated strong convergent validity, such that positive, significant correlations were seen with the Purpose in Life test ($r = .80$, $p < .001$) as well as the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985; $r = .65$, $p < .001$; Bronk et al., 2018). When examining discriminant validity, the CPS was negatively correlated with depressive symptoms ($r = -.34$, $p < .001$). Additionally, Bronk et al. (2018) noted that the CPS’ Beyond-the-Self subscale accounts for additional variance beyond the PIL in predicting openness, empathetic concern, and wisdom ($R^2$ changes = .083, .046, and .047 respectively, all $ps < .001$).

With specific regard for emerging adults, statistical analyses have found that each of the three subscales (Goal-Directedness, Personal Meaning, and Beyond-the-Self) significantly predict an individual’s progress in working on personal values that they hold ($b$’s = .43 -.61, all $p$’s < .001; Pavlacic, 2019). This finding speaks to the significance of the measure, suggesting that individuals with greater perceived levels of purpose are better able to work on valued activities. Additionally, Veazey et al. (2020) found significant positive correlations between CPS total scores and Meaning in Life-Presence scores (an alternative measure of perceived meaning in one’s life that will be discussed later in this paper; $r = .72$, $p \leq .001$). Veazey et al.’s (2020)
findings support the CPS’ utility in assessing both *purpose* and *meaning* constructs among an emerging adult population. The distinct Beyond-the-Self subscale is an important facet of the measure as other well-accepted assessments of purpose (e.g., the Purpose in Life test, or the PIL; Crumbaugh & Maholick, 1964) do not tend to measure the concept specifically via the generation of a subscale score. The Beyond-the-Self subscale, also referred to as self-transcendence, is an essential aspect of meaning (Frankl, 1959). Overall, the use of the CPS in this study allows for the continued assessment of purpose among an emerging adult population, allowing for further psychometric verification for its use and generalizability among other culturally diverse samples.

Although the function of the presence of meaning is not part of the study’s primary hypotheses, its inclusion is warranted given the novelty of the CPS and the exploratory nature of the current study. To reiterate, *purpose* is more goal-directed in scope, which is in line with theories of EF, whereas meaning broadly refers to one’s sense of significance, or the perception that one’s life matters. For this reason, conceptualizations of *purpose* and the CPS specifically, are attended to more prominently in the study’s hypotheses, results, and discussion as compared to *meaning*. However, given the close interrelationships between the two constructs, meaning was more generally assessed as part of the larger study via the Meaning in Life Questionnaire.

**II.2.4B Meaning in Life Questionnaire (MLQ; Appendix F).** The Meaning in Life Questionnaire (MLQ; Steger et al., 2006) is a 10-item measure that employs a 7-point Likert-type scale ranging from *absolutely untrue* to *absolutely true*. Two scale scores are generated, Presence of Meaning (MLQ-P) and Search for Meaning (MLQ-S). Both scales are comprised of five items each. The MLQ-P assesses an individual’s current perceived presence of meaning in life, while the MLQ-S assesses an individual’s motivation to seek meaning in their life. One of
the five MLQ-P items is reverse scored prior to generating the subscale’s summed score. Each subscale is summed to produce a total subscale score ranging from 5 – 35. No total score is generated. Higher scores on the MLQ-P suggest greater degrees of perceived meaning in life. Higher scores on the MLQ-S suggest greater degrees of perceived need to discover meaning. In a study examining meaning in life among U.S. and Japanese populations, researchers utilizing the MLQ found that the average U.S. scores on the MLQ-P were $M = 24.1, SD = 6.7$ while average scores on the MLQ-S were $M = 24.5, SD = 6.6$ (Steger et al., 2008). For the MLQ-S, average U.S. scores were calculated to be $M = 24.5, SD = 6.6$. When looking at the use of the MLQ among a college-student population ($N = 1257$), scores for the MLQ-P were found to be $M = 28.41, SD = 5.46$. Scores for men were $M = 28.26, SD = 5.77$ and scores for women were $M = 28.52, SD = 5.27$ (Weber et al., 2018).

II.2.4B.i MLQ Reliability and Validity. The MLQ has generated exceptional psychometric properties since its publication in 2006. It has been used with a wide variety of populations including individuals receiving mental health services, veterans, and college students (Church et al., 2013; Schulenberg et al., 2011). In a reliability generalization examination of 247 studies that utilized the MLQ and reported Cronbach’s alphas, reliability for both the MLQ-P and the MLQ-S were found to be excellent with values greater than .85 for both subscales (Semma et al., 2018). More recently, the MLQ was validated in an Italian population where confirmatory factor analysis rendered a two-factor structure with excellent reliability for both subscales (MLQ-P: $\alpha = .82$; MLQ-S: $\alpha = .89$; Negri et al., 2020). These findings are consistent with the original MLQ results as well as numerous validation studies of the MLQ, performed both inside and outside of the United States (e.g., Góngora & Castro, 2011).
As for validity support, MLQ scores have demonstrated convergent validity across different constructs including satisfaction with life, self-esteem, and subjective well-being while being inversely related (discriminant validity) to measures of anxiety, depression, posttraumatic stress, and social desirability (for a review, see Steger, 2012 and Li et al., 2021). Presently, it is the most used quantitative measure for assessing meaning in life (Brandstätter et al., 2012).

While both MLQ-P scores and MLQ-S scores are generated with the administration of the MLQ, only MLQ-P scores were utilized in the current study, the rationale being that Veazey et al.’s (2020) study indicated weak, positive correlations between MLQ-S scores and CPS total scores.

II.2.5 Values Measure

Similar to engagement in both purposeful and meaningful behaviors, values-based behaviors highlight an individual’s unique interests. Values-based measures ask respondents to rate the importance of particular values. As previously mentioned, Pavlacic (2019) found that the more meaning an individual has in their life, the easier it is for them to engage in behaviors that move them towards their values. In the current study, utilization of such a measure served an essential function in identifying and incorporating values most important to respondents, as well as whether their values were perceived to be congruent with their behavioral repertoire. Values are an essential aspect of meaning-based conceptualizations and frameworks, and thus, including the Valued Living Questionnaire was useful not only in and of itself, but also in conjunction with the CPS and MLQ.

II.2.5A Valued Living Questionnaire (VLQ; Appendix G). The Valued Living Questionnaire (VLQ; Wilson et al., 2010) is a 10-item measure that addresses the following 10 life domains: (1) family (other than parenting and intimate relations), (2) marriage/couples/intimate relations, (3) parenting, (4) friendship, (5) work, (6) education, (7)
recreation, (8) spirituality, (9) citizenship, and (10) physical self-care (diet/exercise/sleep). An expanded version, the Valued Living Questionnaire-2 (VLQ-2), considers two additional life domains, (11) the environment (caring for the planet) and (12) aesthetics (art, music, literature, beauty; Wilson & Dufrene, 2008). In the first section of the VLQ, the participant rates the importance of each life domain, while in the second section, the participant rates how consistent they have been living within their behavioral repertoire and in accordance to their perceived importance over the last week. Each item is measured on a 10-point Likert-type scale ranging from Not at all important/Not at all consistent to Extremely Important/Completely Consistent. As such, two subscale scores are generated, Importance and Consistency. Additionally, a composite score is generated by multiplying each domain’s importance score by the consistency score, adding the twelve new scores together, and dividing by 12. It is important to note that the VLQ-2 has additional ratings for each of the twelve domains that examine a participant’s possibility of meaningfulness, level of action, satisfaction with action, and concern of progress (Wilson & Dufrene, 2008). For the purposes of this study, these four additional rating areas were not included. Rather, the focus was solely on the ratings and instructions used in the original VLQ: importance and consistency. Thus, the VLQ-2 was not used in the present study given it would have required additional time and effort from participants, and the added questions were not part of the current study’s emphasis.

In a study establishing the psychometric properties of the VLQ, researchers found average importance scores after initial administration across the ten original domains of \( M = 84.65, \ SD = 10.38 \), which yielded an average per-item rating between 8-9 (Wilson, Sandoz, Kitchens, & Roberts, 2010). Average consistency scores were \( M = 68.11, \ SD = 12.82 \), with an average per-item rating of 7 (Wilson et al., 2010). Average composite scores were \( M = 59.52, \ SD \)
= 14.14 (Wilson et al., 2010). Hayes (2019) also reported a community average composite score of 61, though indicates that one’s composite score can fluctuate over time and behavior pattern changes. Examining valued domains individually helps to determine life areas where a participant’s behavioral pattern can be expanded or given more focus, potentially desired emphases if importance is rated higher than consistency.

II.2.5A.i VLQ Reliability and Validity. The VLQ has generated impressive psychometric properties since its original developmental work published in 2010. It has been utilized with a wide variety of populations including individuals receiving mental health interventions, specifically Acceptance and Commitment Therapy (ACT; Zargar et al., 2013), as well as caregivers of patients with dementia (Romero-Moreno et al., 2017), people with substance use problems (Miller et al., 2016), weight management patients (Finger et al., 2020), college students (Çekici, 2019; VanBuskirk et al., 2012), and health care workers (Nilsson et al., 2011).

When examining the utility of the VLQ among minority groups (i.e., Black American participants), researchers reported excellent reliability support for the composite score (α = .91; VanBuskirk et al., 2012). Reliability for both VLQ importance scores and VLQ consistency scores were also excellent, with Cronbach’s alpha values of .90 and .82, respectively (VanBuskirk et al., 2012). Additionally, VLQ scores have demonstrated convergent validity across similar tools that examine valued living, including the Valuing Questionnaire (VQ; Smout et al., 2014), while being inversely correlated with measures of anxiety, depression, and stress (Miller & Orsillo, 2020; VanBuskirk et al., 2012).

II.3 Procedure

Initially, this study was conducted via a hybrid model of both online and laboratory settings for participants that wished to participate in both portions of the study. Respondents
were recruited through SONA, an online program designed to encourage students to participate in research studies in exchange for class credits. From November 2019 to February 2020, participants initially completed self-report measures online at their convenience, followed by an individual in-person appointment where EF tasks were administered. However, due to the University of Mississippi’s restrictions in response to the novel coronavirus (COVID-19) pandemic, in-person portions of the studies were halted in March 2020 (e.g., Abouk & Heydari; Legate et al., 2021; Omer et al., 2020). Following COVID-19 university guidelines, online surveys were permitted to continue and were completed through Qualtrics, an online data collection platform used by the University of Mississippi, until May 2020. This method of data collection (Qualtrics) was initially chosen for ease of administration and enhancing data entry accuracy.

During recruitment, participants followed a hyperlink where they completed the study’s demographic questionnaire as well as the self-report measures, specifically the BDEFS-SF, SSRQ, CPS, MLQ, and VLQ. The order of self-report measures was counterbalanced across participants to account for the presence of any order effects. Following the completion of the Qualtrics portion of the study, between November 2019 and February 2020 participants were presented with an announcement indicating they were eligible to attend the in-person section of the study along with a hyperlink to sign up for the in-person study. This invitation was removed following the initiation of COVID-19 restrictions and instead, was replaced with a verification of study completion. Identifiable participant information was not kept, utilizing the anonymity features of the Qualtrics program. However, to keep survey data together throughout the study, individuals were asked to create a unique participant code using their birth date’s month and day, where two digits were used for the month and two digits were used for the day (e.g., May 5;
In addition, the last four digits of their cellphone number were also used, creating a unique 8-digit code.

Attention check items were included in the surveys to minimize random responding and ensure the validity of the data obtained via the self-report measures. Despite mixed views on whether attention check items are beneficial or necessary, Kung et al. (2018) found no evidence that adding attention check items to online surveys pose a threat to a measure’s validity, influence participant answers, or cause confusion. Further, adding warning instructions such as “...responding without much effort would result in loss of credits” actually increased participants’ response quality (Huang et al., 2012; Kung et al., 2018). As such, both attention check items and a cautionary instruction were included in the present study. Commonly used attention checks (e.g., “please select 4 for this item”) were included on measures with more than 10 items and which have numbered-responses to choose from (Huang et al., 2012; Kung et al., 2018). For items with word responses, a common attention check (e.g., “please select moderately accurate for this item”) was included (Huang et al., 2012). The interested reader is referred to Appendices B-F for specific placement and examples of attention checks that were used in the online portion of this study.

For the in-person portion of the study completed between November 2019 and February 2020, participants completed three D-KEFS tasks with a qualified examiner (the Color-Word Interference Test, the Verbal Fluency Test, and the Sorting Test). To ensure as much consistency as possible and to minimize confounding variability, the EF tasks were presented in the same order to each participant. The Color-Word Interference Test was administered first, followed by the Verbal Fluency Test and the Sorting Test. Each subtest of the D-KEFS was developed to be administered and interpreted as a stand-alone instrument (Delis et al., 2001c). Therefore, the
order of administration is not an essential concern in typical neuropsychological testing sessions involving these measures, and therefore was not a concern in the current study (Delis et al., 2001b, 2001c).
CHAPTER III: RESULTS

III.1 Participant Demographics

III.1.1 Screening and Missingness

Prior to completing the online self-report measures for this study, participants were asked to verify their age in an effort to screen for appropriate age range (ages 18-29 years). After reporting their age and checking reported ages fell within the appropriate age range, 944 completed the initial online self-report survey through the University of Mississippi’s Qualtrics platform. One hundred and fifty participants were excluded for having unfinished surveys or duplicate survey responses. A participant’s survey was considered unfinished if their responses rendered more than one value missing within that specific measure or values from an entire measure were incomplete. For individuals that were not considered to have unfinished data results according to the criteria previously mentioned although had, at most, one value missing within that specific measure, missing values were filled using each specific measure’s mean value. The removal of unfinished survey and duplicate survey responses from the data pool ultimately resulted in 844 participants considered eligible for the subsequent data analyses of the self-report measures. Of these 844 participants, 32 signed up and completed the in-person/in-lab D-KEFS testing portion, which was ultimately terminated much earlier than expected due to university COVID-19 protocols implemented in early March 2020 in response to the worldwide coronavirus pandemic (e.g., Legate et al., 2021). Unfortunately, the number of in-lab participants was low compared to the needed sample size for adequate power, which was 77. This played a role in data analyses and results that will be discussed later.
III.1.2 Online Participants

The demographics for the analyzed sample of 844 respondents are presented in Table 1. The sample consisted of 574 emerging adult self-identified females, 269 emerging adult self-identified males, and one emerging adult who self-identified as non-binary. The mean age of the sample was 18.97 years ($SD = 1.27$) and participants ranged from 18 to 29 years old. Regarding education level, a majority (71.4%) of the sample identified as freshman, 18.5% identified as sophomore, 6.6% identified as junior, 3.2% identified as senior, and less than 1% identified Other as their student status. The majority of the sample (81.2%) identified as White, 14.3% identified as Black, 4.4% identified as Asian/Asian-American, 4% identified as Hispanic/Latino(a), and 1.2% of the sample identified as Native American/Native Alaskan. One participant identified as Other and no participants identified as Native Hawaiian or Pacific Islander. With respect to living arrangements, about three-fourths of the sample reported that they lived on campus (74.1%) in either a dorm, Greek life housing, or campus apartment, while the rest of the sample reported living off-campus in either an apartment or a house. As for the employment status of the sample, 43.2% indicated that they only worked during the summer months, 31.5% reported being unemployed, 20.3% indicated working part-time, and only 5% indicated having full-time employment. Regarding sexual orientation, the sample primarily identified as heterosexual (straight; 93.4%), with 2.8% of the sample identifying as bisexual, 1.2% identifying as gay, 0.6% identifying as asexual, 0.4% identifying as pansexual, 0.4% identifying as lesbian, 0.1% identifying as queer, and 0.6% identifying as other. Additionally, 0.6% of the total sample preferred not to disclose their sexual orientation.

Regarding neurocognitive concerns, 134 members of the total sample ($N = 844$) identified as an emerging adult, formally diagnosed by a medical physician with either a
developmental disorder or a major brain condition (e.g., ADHD, Autism Spectrum Disorder [ASD], Traumatic Brain Injury [TBI], epilepsy, etc.). Thirteen participants preferred not to disclose this information. As such, these participants were initially removed from the sample prior to conducting statistical analyses to account for whether neurocognitive concerns appeared to be serving as a possible mediating or moderating factor. However, upon conducting these analyses, no statistically significant differences were apparent whether or not the 146 participants were included in the final analyses. Thus, ultimately the total sample of 844 respondents was retained for the subsequent statistical analyses involving the self-report measures.

### III.1.3 In-Lab Participants

Of the 844 participants who completed the online portion of the study, 30 completed the in-lab portion (i.e., the three D-KEFS tasks). This in-lab sample was initially comprised of 32 participants; however, two participants’ data were not included in the D-KEFS analysis as their online data were removed upon data cleaning. In particular, these individuals failed to correctly answer multiple attention check items. Thus, the remaining 30 participants comprised the in-lab sample, as they offered solid, complete data for the online portion of the study, as well as attended and completed the in-lab study measures. The demographics of the 30 in-lab participants are presented in Table 2.

Of these 30 individuals, 20 participants self-identified as female and 10 self-identified as male (Table 2). The mean age of the in-lab participants was 19.30 years ($SD = 2.04$) with an age range of 18 years to 29 years old as well. Regarding education level, a majority (66.7%) of the sample identified as freshman, with 20.0% identifying as sophomore, 10.0% identifying as junior, and 3.3% identifying as senior for student status. With respect to race/ethnicity, most of the in-person sample identified as White (70.0%), with 30% identifying as Black and 3.3% (one
participant) identifying as Asian/Asian-American. Of note, one participant identified as both Black and White, thus leading to the above 100% descriptive. None of the in-lab participants identified as Hispanic/Latino(a), Native American/Native Alaskan, Native Hawaiian or Pacific Islander, or “Other.” About dwellings, most in-lab participants indicated that they lived in an on-campus dorm (63.3%). None of these on-campus participants indicated living in Greek life housing or a campus apartment. The other in-lab participants reported living off-campus in either an apartment or a house (36.4%). As for employment, approximately half of the in-lab participants (53.3%) indicated that they only worked during the summer months. Of the remaining participants, 33.3% reported being unemployed and 13.3% reported holding a part-time job. Regarding sexual orientation, a majority of in-lab participants identified as heterosexual (straight; 83.3%), with two participants identifying as bisexual (2.7%), two participants identifying as asexual (2.7%), and one participant identifying as queer (3.3%). No in-lab participants identified as gay, pansexual, lesbian, or other.

Regarding neurocognitive concerns, three participants of the total in-lab sample (N = 30) reported having been diagnosed by a medical physician with either a developmental disorder or a major brain condition. Specifically, all three participants reported being diagnosed with ADHD. Three participants preferred not to disclose this information. As with the total sample (N = 844), the six participants that disclosed being diagnosed with ADHD or chose not to disclose such information were removed from the sample prior to conducting statistical analyses to account for any possible confounding influences. Similarly, no statistically significant differences were noted whether these three participants were included in the final analyses. Thus, these six participants’ data were retained for the subsequent data analyses (N = 30).

III.2 Measure Results
III.2.1 Online Descriptives

Analyses of the descriptive statistics of the total sample’s (N = 844) scores from online self-report measures were conducted following data screening procedures (e.g., checking for emerging adult age range), data collection, and cleaning of the data (e.g., addressing missingness). Descriptives for measures pertaining to the goal of this study (examining the relationship between executive functioning and purpose in life) are discussed in detail below. Ancillary measures used in this study to help examine validity in an exploratory nature can be found in Table 3, including their minimum and maximum values, means, standard deviations, and reliability coefficients.

Emerging adult participants reported low levels of deficits in executive functioning (M = 37.24, SD = 10.96) when compared to normative data for this age range (18-29 years). Typically, individuals that have marked EF concerns yield a deficits summary score mean of 140 (Barkley, 2011), suggesting that this sample generally reported minimal EF concerns at the time of data collection. The reliability coefficient for the BDEFS-SF total EF deficit summary score was similar to past studies’ findings (α = .92), indicating excellent internal consistency for the BDEFS-SF as a measure of overall EF deficits (Barkley, 2011; Sheble, 2018). All BDEFS-SF subscale Cronbach’s alphas were also at or above .78 indicating good to excellent internal consistency (DeVellis, 2003; Vaske, 2008). Means, standard deviations, and reliability coefficients can be found in Table 3. As such, the BDEFS is considered a useful measure of EF deficits, though may exhibit more utility among a population with preceding EF concerns where subscale examination is warranted.

When looking at levels of perceived purpose from scores on the CPS among the total emerging adult sample, participants reported average levels of total perceived purpose (M =
This is consistent with past studies involving emerging adults in college that included analysis of perceived purpose in life utilizing the CPS (e.g., Pavlacic, 2019; Veazey et al., 2020; Weber, 2021). Reliability coefficients for total purpose as well as CPS subscales resulted in alphas at or above .84, indicating excellent internal consistency (DeVellis, 2003; Vaske, 2008). This is also comparable to past study findings involving the CPS, further supporting the CPS as a useful measure of perceived purpose. All descriptive results can be found in Table 3 as well.

Briefly examining the ancillary measures, the SSRQ total self-regulation summary score yielded the lowest reliability coefficient (α = .73), which by conventional standards still indicates adequate internal consistency (DeVellis, 2003; Vaske, 2008). While total self-regulation scores were moderate among this population, other external factors, such as social desirability, could have contributed to the current results as noted by Carey et al.’s (2004) findings when using the SSRQ among a college student population. Other measures including the MLQ and VLQ (and their subscales) also yielded excellent alpha levels, supportive of their considerable utility to measure meaning in life and valued living, respectively.

**III.2.2 In-Lab Descriptives**

Analyses of the descriptive statistics of the participants that completed the in-lab portion of the study are described below (N = 30). As with the descriptives for the total sample, measures pertaining to the goal of this study (examining the relationship between executive functioning and purpose in life) are discussed in detail. Results from both primary and ancillary measures can be found in Table 4, including their minimum and maximum values, means, standard deviations, and reliability coefficients.

Emerging adult in-lab participants also reported low levels of deficits in executive
functioning ($M = 35.03, SD = 8.46$) when compared to data norms, thus supporting that this sample had minimal EF concerns at the time of data collection. The reliability coefficient for the BDEFS-SF total EF deficit summary score among in-lab participants was also like past studies’ findings ($\alpha = .88$), indicating excellent internal consistency for the BDEFS-SF and supportive of the instrument as a measure of overall EF deficits (Barkley, 2011; Sheble, 2018). However, Cronbach’s alphas for the BDEFS-SF subscales varied from a low of .67 to a high of .90. While still considered to have fair to excellent internal consistency, the range may be due to the small sample size ($N = 30$; DeVellis, 2003; Vaske, 2008). Means, standard deviations, and reliability coefficients can be found in Table 4. As such, the BDEFS is still considered to be a useful measure of EF deficits with the previous considerations previously discussed.

Objective measures of executive functioning were also administered during the in-lab portion, yielding scores for the following D-KEFS subtests: the Verbal Fluency Test, Color-World Interference Test, and Sorting Test. Specific scores from each subtest were utilized in accordance with the study’s use of Miyake’s (2000) three-factor model of executive functioning (inhibition, updating, and shifting). Participants’ Color-World Interference Test’s Inhibition score was utilized to analyze total inhibition, the Sorting Test’s Combined Description score was utilized to examine updating, and the Verbal Fluency Test’s Category Switching total score was utilized to analyze shifting ability. Descriptives for these D-KEFS subtests, such as minimum and maximum values, means, and standard deviations, can be found in Table 5. Values have been converted to scaled scores, where a scaled score between 8 and 12 is considered average (Delis et al., 2001a). In lab participants’ Color-Word Interference Test Inhibition scores yielded a mean scaled score value of 11.63 ($SD = 1.78$), indicating average ability to restrict a learned behavior. Next, in-lab participant’s Verbal Fluency Test’s Category Switching scores yielded an
average scaled score value of 9.43 ($SD = 2.32$), again, indicating average abilities to cognitively update information presented to them and utilize problem-solving skills accordingly. Lastly, the Sorting Test’s Combined Description scores resulted in a mean scaled score value of 10.60 ($SD = 3.55$), suggesting that the in-lab sample had minimal difficulty shifting between sets of rules and applying rules when needed. The resulting D-KEFS scores are typical of individuals who have no presumed EF deficits. However, the small sample size warrants caution when interpreting in more detail as there was a limited range of scores to analyze. Overall, in-lab participants had minimal EF concerns.

When looking at levels of perceived purpose from scores on the CPS among in-lab participants, average levels of total perceived purpose were reported ($M = 47.45, SD = 7.70$). These data are also consistent with the study’s total sample of emerging adults as well as past findings (e.g., Pavlacic, 2019; Veazey et al., 2020; Weber, 2021). Reliability coefficients for CPS total purpose and subscale scores were each calculated to be at or above .81, indicating excellent internal consistency (DeVellis, 2003; Vaske, 2008). These descriptive results can be found in Table 4 along with ancillary measure descriptives. Furthermore, self-report measures of in-lab participants were consistent with each measure’s findings with the study’s total sample as well as previous research. As such, all self-report measures as well as objective measures completed in-lab were interpreted to be sound measures of their respective concepts among emerging adults in college, specifically EF deficits, self-regulation, purpose in life, meaning in life, and valued living.

III.3 Statistical Analyses of Study Hypotheses

Next, primary statistical analyses of the study hypotheses were conducted. Each hypothesis is noted below, followed by its respective method of statistical analysis. Statistical
analyses were conducted using SPSS statistical software version 26 and the criterion for statistical significance was $p < .05$. Due to the novelty of the current study in examining EF in relation to purpose in life, exploratory data analysis (EDA; Tukey, 1977) was utilized to explore broad contexts with the goal of creating increasingly detailed hypotheses that allow for quantitative methods to be applied. Therefore, an ancillary goal of this study was to conduct additional statistical analyses with respect to subscales of assessment measures, as well as consideration of the meaning variable, as a course of due diligence.

**III.3.1 Relationships Between EF and Purpose in Life**

- **H1A:** Lower levels of overall self-reported deficits in EF skills will be significantly correlated with higher levels of overall self-reported purpose in life.

  Generally, a correlation coefficient of 0.3 is considered adequate based on Cohen’s (1988) statistical recommendations and continues to be widely supported in behavioral science research. Additionally, a power value of 80% is commonly used in conjunction with such effect sizes for correlation analysis (Bujang & Baharum, 2016). An *a priori* power analysis for an exact distribution correlation was conducted in G*Power 3.1, a free power analysis program for a variety of statistical tests, to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, and a medium effect size ($\rho = 0.30$). Based on the aforementioned assumptions, the desired minimal sample size was 84 (Faul et al., 2009). The calculated Pearson $r$ correlation indicates that hypothesis 1A was supported. The correlation was calculated using BDEFS-SF summary scores and CPS total scores, yielding a significant negative correlation ($N = 844$), $r (842) = -.42$, $p < .01$, one-tailed. These results can be found in Table 6.

  To further investigate what specific aspects of executive functioning contributed the most to perceived purpose in life, a multiple regression was carried out to investigate whether BDEFS-
SF subscales (Self-Management to Time, Self-Organization/Problem Solving, Self-Restraint, Self-Motivation, and Self-Regulation of Emotion) significantly predict total CPS scores. As presented in Table 7, the results of the regression indicated the model explained 21% of the variance and that the model was a significant predictor of CPS total scores \((N = 844), F(5.838) = 43.28, p < .001\). Fewer deficits in Self-Management to Time significantly predicted participants’ perceived purpose in life \((\beta = -.40, p < .001)\), as did fewer deficits in Self-Motivation \((\beta = -.86, p < .001)\). The other three BDEFS-SF subscales did not significantly contribute to the model.

- **H1B: Objective measures levels of EF will predict higher levels of overall self-reported purpose in life.**

An *a priori* power analysis for a multiple regression model where individual scores from each of the three D-KEFS subtests as predictors, specifically, the Color-Word Interference Test: Inhibition score, the Verbal Fluency: Switching Category score, and the overall Sorting Test score were used as predictors for overall CPS scores. A power analysis was conducted in G*Power 3.1 to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, and a medium effect size \((f^2 = 0.15)\) (Faul et al., 2009). Based on the assumptions previously discussed, the desired sample size was 77. However, the sample size was unattainable due to the university’s closing and termination of on-campus activities in response to COVID-19 safety protocols (e.g., Legate et al., 2021). Prior to the university’s closure in early March 2020, only 30 of the intended participants had completed the three D-KEFS subtests included in the following statistical analysis.

To investigate what specific aspects of executive functioning contributed the most to perceived purpose in life using objective testing scores, a multiple regression analysis was
carried out to investigate whether the three D-KEFS subscale scores significantly predict total CPS scores. These analyses are reported in Table 8. The results of the regression indicated that the model only explained 9% of the variance. The model was not a statistically significant predictor of CPS total scores \((N = 30), F (3,26) = .86, p < .001\), thus the three D-KEFS subscales used in the study were not predictive of perceived purpose.

### III.3.2 Relationships Between Self-Regulation and Purpose in Life

- **H2**: Higher levels of overall self-reported self-regulatory abilities will be significantly correlated with higher overall self-reported levels of purpose in life.

  Similar to the H1A analyses, a Pearson \(r\) correlation was calculated using SSRQ total scores and CPS total scores. Bivariate correlation results are included in Table 6. The same \textit{a priori} power analysis and results for an exact distribution correlation was conducted in G*Power 3.1 to determine sufficient sample size. Similar to H1A, the data were more than sufficient for the calculation. The Pearson \(r\) correlation indicates that H2 was supported, as the correlation between SSRQ summary scores and CPS total scores was statistically significant \((N = 844), r (842) = .06, p < .05\), one-tailed.

### III.3.3 Relationships Between Self-Regulation and Inhibition

- **H3**: Higher levels of overall self-reported self-regulatory abilities will be significantly correlated with higher scores on an objective measure of inhibitory skill.

  A Pearson \(r\) correlation was calculated using in-lab participants’ SSRQ total scores and D-KEFS’ Color-Word Interference Test: Inhibition scores to investigate whether self-regulation ability is significantly related to an individual’s objective inhibitory skill. The same \textit{a priori} power analysis for an exact distribution correlation was conducted in G*Power 3.1 to determine a sufficient sample size. Similar to H1B, due to COVID-19 protocols, the needed sample size
was not obtained. The correlation, calculated using SSRQ summary scores and D-KEFS Color Word Interference Test: Inhibition scores from the in-lab participants, yielded a nonsignificant value among the participants that completed both the self-report questionnaires and the in-lab objective assessment \((N = 30), r (28) = .19, p = .32\), one-tailed. Results of this analysis can be found in Table 9.

### III.3.4 Relationships Between Purpose in Life and Meaning in Life

- **H4**: Higher levels of overall purpose in life will be significantly correlated with higher levels of presence of meaning in life.

Finally, another Pearson \(r\) correlation was calculated using CPS total scores and MLQ-P scores. The same *a priori* power analysis for an exact distribution correlation was conducted in G*Power 3.1 to determine that the sufficient sample size for H1A was more than sufficient for H4. The correlation, calculated using CPS total scores and MLQ-P scores, yielded a statistically significant positive correlation \((N = 844), r (842) = .76, p < .001\), one-tailed. The specific correlation is also embedded with the bivariate correlation table in Table 6.

To further examine the relationship between purpose and meaning scores in an exploratory fashion, a multiple regression was carried out to determine whether CPS subscales (Goal Directedness, Personal Meaning, and Beyond-the-Self) significantly predict MLQ-P scores. These analyses are presented in Table 10. The regression model explained 70% of the variance. The model was a statistically significant predictor of MLQ-P scores \((N = 844), F (3,840) = 644.70, p < .001\). The three subscales of the CPS predicted MLQ-P scores such that, having more perceived importance or worth in one’s life significantly predicted the presence of perceived meaning (Personal Meaning; \(\beta = 1.28, p < .001\)), as does engaging in behaviors that move people toward their respective goals (Goal Directedness; \(\beta = .18, p < .001\), and
prioritizing the importance of making an impact in the world (Beyond-the-Self; $\beta = .16, p < .001$).
CHAPTER IV: DISCUSSION

Upon completing a thorough review of the literature, it was apparent that, despite justification for the need, little research exists at present that examines EF in relation to purpose in life. The present study utilized a combined methodology of online survey and in-person assessment to examine the relationship between EF and purpose in life. The sample was drawn from an emerging adult population attending college at a large university located in the Southern United States. Recruitment efforts yielded data from over 800 emerging adults (ages 18-29 years) for the online portion of the study. With respect to the in-person portion of the study, the COVID-19 pandemic disrupted recruitment. For an extended period, approximately 15 months, in-person classes and activities were prohibited, which ultimately resulted in an in-person sample size of 30. As such, only a portion of the results of the present study were consistent with hypotheses, however, the results nevertheless provide useful information for future studies that wish to examine the relationship between EF capabilities and the development or fostering of purpose in one’s life.

Most of the total sample ($N = 844$) reported minimal EF deficits, including individuals who reported a clinical diagnosis(es) of either a neurocognitive or developmental disorder. This is important as it supports the notion that most emerging adults in this specific college student sample are functioning at a cognitive level that fosters critical thinking and problem-solving skills. Brain development during early emerging adulthood, as most of this sample included ($M = 18.97$ years; $SD = 1.27$), is a crucial time for changes in association cortices and frontolimbic systems that are responsible for the development of effective attention skills, reward pathways,
and social processes (Pérez-Edgar & Taber-Thomas, 2015). While the individuals comprising this sample will continue to experience neurodevelopmental changes, results support past literature where a shift to a more balanced state of bottom-up and top-down processing is seen following development from adolescence and into emerging adulthood (Casey et al., 2008; Steinberg, 2008). During this time, better EF skills are honed to help promote improved self-regulation, the understanding of negative consequences, and engagement in goal-oriented behavior, though these individuals continue to remain vulnerable to a variety of influences, such as social and environmental factors (Pérez-Edgar & Taber-Thomas, 2015).

Results from the total sample’s online measures also highlight the insight emerging adults have into both purpose and meaning in their lives. Consistent with past findings of studies that included college student participants, average levels of perceived purpose in life were reported. This supports that emerging adulthood is a critical developmental period for brain maturation, as well as the fostering of higher-level processes that can facilitate the formation of future goals and world views (Dezutter et al., 2014). While average levels of purpose are typically seen among emerging adults in college (e.g., Pavlacic, 2019; Veazey et al., 2020; Weber, 2021), perceived purpose in life and engagement in meaningful behavior tend to fluctuate throughout an individual’s lifetime when considering changing contextual factors (e.g., environment, employment, family; Bronk et al., 2009; Rockenbach et al., 2014). Nevertheless, valued self-contemplation or social discussion on the concept of purpose helps to facilitate goal-directed behaviors (Bundick, 2012; Martela & Steger, 2016). As such, it would seem that encouraging emerging adults in college to engage in self-reflection or in-depth conversations is salient in the current times following a global pandemic and very much needed.

IV.1 Relationships Between EF and Purpose in Life (Hypotheses 1A & 1B)
Consistent with hypothesis 1A (*lower levels of overall self-reported deficits in EF skills will be significantly correlated with higher levels of overall self-reported purpose in life*) and hypothesis 1B (*objective measures of EF will predict higher levels of overall self-reported purpose in life*), the present findings suggest that a relationship between EF capabilities and purpose in life exists, such that lower scores on measures of EF deficits (BDEFS scores) were significantly associated with higher levels of perceived purpose in life (CPS scores). In other words, better executive functioning skills were related to a greater degree of perceived purpose in life among the emerging adult respondents comprising the sample. This finding is in line with previous research when considering that purpose encompasses and requires an individual to engage in goal-directed behavior, another key aspect of various EF skills (e.g., Bronk, 2009; Bronk et al., 2020; Kosine et al., 2008; Kruglanski et al., 2000; Vazeou-Nieuwenhuis et al., 2017).

When considering emerging adulthood, especially emerging adults enrolled in college, prioritizing, and organizing life goals are highly essential actions to undertake in an effort to move towards success. Examples include tasks such as establishing priorities for necessary courses and completion of vital assignments, which can facilitate movement towards completion of major requirements, college graduation, and even proactive preparation for the next chapter in a graduate’s life. However, the self-regulating of one’s behavior is also necessary and coincides with higher academic functioning (Eisenberg et al., 2001; Olson et al., 2007). For instance, an emerging adult in college may have to make the decision to stay home to study over attending a college party or possibly an athletic event if a goal is to complete college within a certain timeframe or to perform at a level that would afford the opportunity to continue on to graduate school. Making the conscientious decision to engage in goal-directed behaviors versus
rewarding-seeking behaviors (e.g., fun activities) can be especially difficult for college students given the brain’s development during early emerging adulthood (Pérez-Edgar & Taber-Thomas, 2015; Vanes et al., 2020). Early emerging adult’s brain structure is going through a period of instability where increased volumes of the frontolimbic structures has been associated with a “spike” in risky behaviors (Pérez-Edgar & Taber-Thomas, 2015, pp. 11). Risky behaviors can be associated with social opportunities and activities that are typically offered on college campuses and can lead to several peer influences and pressures (Weitzman et al., 2003). However, longitudinal research by Moffitt et al. (2011) showed that it is not impossible to choose to engage in goal-oriented behaviors over risky behaviors during emerging adulthood, though acknowledges the difficulties many emerging adults face in finding the balance in doing so.

This relationship between EF skill capabilities and perceived purpose in life among emerging adults is also consistent with previous research where emerging adults report searching for purpose during this time of life, ultimately leading to greater life satisfaction (Bronk et al., 2009). As such, EF deficits among this population, developmentally, would make it quite difficult to develop, organize, and prioritize current goals (Pérez-Edgar & Taber-Thomas, 2015). Even further, it would be highly difficult to then behaviorally act in ways that are congruent with these goals and understand how such goals foster a perceived sense of purpose. Because of the minimal pre-existing literature that investigates both concepts in conjunction with one another, these preliminary results serve as necessary evidence warranting the continuation of empirical research geared toward further examining these concepts in relation to one another.

Ancillary analyses of the relationship between EF and purpose in life (CPS scores) where objective measures of EF skills were utilized (D-KEFS Color-Word Interference Test, Verbal Fluency Test, and Sorting Test scores), were not supported. The reasons for this lack of statistical
significance remain unclear. However, the small sample size ($N = 30$) is clearly problematic, as a priori analyses indicated a minimum sample size of 77 was necessary to have adequate power and obtain, at minimum, a medium effect size. Due to university safety regulations put in place in response to the COVID-19 global pandemic, it was simply not possible to attain the ideal sample size sought for these analyses. For these various reasons, the rationale and justification for continuing this aspect of the study remains. Simply stated, further research is needed to gain a better understanding of whether objective measures of EF also exhibit a statistically significant relationship with perceived purpose in life, as was demonstrated via self-report measures.

Nevertheless, the preliminary research results this study generated between these two concepts (EF and purpose in life) is promising. It presents an interesting and important contribution to the current literature, one that does not seem to exist to any degree between two concepts that are typically viewed and conceptualized as independent of one another: EF and purpose in life. Additionally, the extent of behavioral repertoires that which EF and purpose in life require, highlights the interconnectedness among psychological models involving both brain behavior and physical behavior.

**IV.2 Relationship Between Self-Regulation and Purpose in Life and Self-Regulation and Inhibition (Hypotheses 2 & 3)**

With regards to hypothesis 2 (*higher levels of overall self-reported self-regulatory abilities will be significantly correlated with higher overall self-reported levels of purpose in life*), as well as hypothesis 3 (*higher levels of overall self-reported self-regulatory abilities will be significantly correlated with higher scores on an objective measure of inhibitory skill*), the relationship between an individual’s ability to self-regulate their behaviors and their perceived purpose in life was examined. Both hypotheses were influenced by previous research that has
suggested substantial overlap of EF factors, such as impulsivity, with self-regulation qualities (Vohs & Heatherton, 2000). However, the results of the current study indicated no statistically significant relationships between the self-reported self-regulatory abilities and perceived purpose in life. This contrasts with the finding that was seen between EF as a whole and purpose in life. This may be related to the intricacies that are involved to describe EF as a whole and the differences that exist when theories are not only combined, but also split as individual concepts. It also highlights that perceived purpose in life may not directly rely on self-regulation capabilities and rather, involves various EF skills to fully comprehend the concept of purpose in one’s life and how they choose to live in accordance with their broader values.

Another important note to be considered is the varying theories and definitions of EF and its components. As such, the general conceptualization of self-regulation that is utilized most often in current adult research relates to substance use and risk-taking behaviors (Carey, Neal, & Collins, 2004; Moffitt et al., 2011). Substance use was not addressed in the current study, though importance to explore as it may have played a role in the differences seen when assessing EF as a whole and its relation to purpose in life. Specifically, participants’ ability to understand and answer questions mindfully rather than out of common substance use side effects may have been impacted if participants were currently using substances as seen in a study by Cavicchioli et al. (2019). Some common side effects seen substance use studies on self-regulation capabilities on cognitive tasks included impulsivity and delayed reaction times (e.g., Kaag et al., 2014; Wiers et al., 2015). This particular theory of self-regulation may also be driven by different behavioral components than initially understood if considering purpose and values. As such, it makes sense that these differences would be seen in the current study, if so. While Miyake and Friedman’s (2012) three-component model incorporates inhibitory proficiencies that encompass one’s ability
to regulate their behaviors and substance use research incorporates similar factors, neither largely focus on regulatory abilities when considering movement towards purpose in one’s life as the current study includes. This also highlights the importance of being able to continue research where objective measure of inhibition can be fully assessed. Continued research can then be compared to objective measures of self-regulation that currently exist and that do not stem from the substance use literature in an effort towards consistency in behavioral effects.

IV.3 Relationship Between Purpose in Life and Meaning in Life (Hypothesis 4)

Consistent with previous literature, the findings from the current research regarding hypothesis 4 (higher levels of overall purpose in life will be significantly correlated with higher levels of presence of meaning in life), showed that overall purpose in life was significantly correlated with higher levels of presence of meaning in life. Because emerging adulthood is considered the next developmental transition following adolescence, it is understandable that meaning and purpose remain related as the two concepts have been conceptualized by some as being nearly the same notion throughout adolescence (Bronk & Mangan, 2016; Damon, 2008; Damon et al., 2003). Nevertheless, it is important to note that current conceptualizations and research, while delineating significance, purpose, and coherence as elements of meaning (albeit primarily) in adult samples (e.g., Bronk & Mangan, 2016; Damon et al., 2003; George & Park, 2014; Heintzelman & King, 2014; Morgan & Farsides, 2009), the developmental trajectory of these concepts throughout childhood, adolescence, and adulthood remains to be illuminated. Significance has to do with the perception that our lives matter, purpose has to do with goal-driven, values-congruent behavior, and coherence has to do with meaning making, that is, how we understand and make sense of the world around us (Steger et al., 2006). There is no specific age or time when these concepts tend to differentiate themselves from one another. As current
research grows on meaning and purpose among emerging adults, so too will our understanding of critical time periods that can aid in the conceptualization of these and related concepts (Dezutter et al., 2014).

From a broader perspective, the similarities between meaning and purpose and their overlap have been well established, though continue to be explored for better clarity (e.g., Bronk & Mangan, 2016; Heintzelman & King, 2014; George & Park, 2014; Martela & Steger, 2016). As such, the results of the current study indicate that the relationship between both meaning and purpose continues to exist, even among this specific population. Additionally, the results continue to contribute to the validity and consistency of both measures and their concepts across different regions in the United States. However, the breakdown of purpose and meaning by various diverse identities (e.g., ethnicity, religion, sexual orientation, etc.) were not examined as they were not part of the current study’s overall aim.

**IV.4 Study Limitations and Directions for Research**

While this study is strengthened by its large online participant sample size and overall diversity, limitations nevertheless exist. One limitation of the study design is the use of self-report data via an internet-based platform for data collection. Although various studies indicate that online data collection via well-established university platforms (e.g., Qualtrics) provides a valid and reliable method for recruiting participants, self-report data using online platforms inherently involve the risk of dishonest responding by participants, especially when exploring the concepts involved in the current study (Hunter, 2012; Lefever et al., 2007). Nevertheless, screening protocols for such responding including verification questions and attention checks (as those included in the present study), do not fully guarantee that participants answer genuinely. However, research has shown such measures do increase overall quality of participant reporting
Future studies may wish to continue the in-person method of data collection for enhanced verification of participants’ responses. However, online data collection does allow for strengths such as the easier collection of data across diverse participants. For example, in the current study, those identifying as part of the LGBTQIA+ community, were more represented than the latest data available for LGBTQIA+ individuals across the state (The Williams Institute, UCLA School of Law, 2019), Additionally, the ease of completion as the online data could be collected via any computer or smart phone, which allowed for more efficient data collection overall as participants could complete questionnaires in privacy if they desired to do so.

The present study restricted participation to a particular developmental period, specifically emerging adulthood (ages 18-29 years; Arnett, 2015), and a specific context, notably the college environment, in order to control for life experience as well as brain development. Future studies should include broader samples of emerging adults (e.g., those not attending college, those with various EF-related deficits) to examine potential effects enrollment in college and particular EF-related deficits have on the relationship between EF and perceived purpose in life. Additionally, replication of these finding among different populations would be greatly beneficial to the generalization of the public. Many emerging adults do not attend a 4-year university following high school graduation (Arnett, 2014), in contrast to the present sample. Including emerging adults that choose a different life path is a highly important and extremely valuable avenue to pursue in future studies examining EF and perceived purpose in life. Examples of diverse avenues of empirical inquiry include people directly entering the work force out of high school, those who enlist in the military, and those who attend trade school.

Life experiences, such as various trauma-inducing events, bereavement, discrimination,
job loss, adverse childhood events (ACEs; e.g., physical, sexual, or emotional abuse, neglect, alcohol and substance use in the household, living with a parent with a serious mental illness, having a parent incarcerated, witnessing domestic violence), etc. may have played a role in the fostering and presence of purpose in life among participants in the current study as suggested by previous research (Pfund et al., 2020; Schulenberg, 2020). Future studies should include psychometrically sound measures of such events, such as the ACEs Questionnaire (Felitti et al., 1998), the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013), and/or the Integration of Stressful Life Experiences Scale (ISLES; Holland et al., 2010). Given the complexities that have been brought on by the COVID-19 global pandemic, assessment of such life experiences could be seen as necessary in future studies as higher levels of ACEs were reported throughout stricter quarantine guidelines largely related to parenting stress and health disparities (Bryant et al., 2020; Sonu et al., 2021).

Additionally, it is important to highlight possible substance use and the impact it may have on perceived purpose in life. Such aspects should be thoroughly assessed in the future. This aim would call for a deep dive into the literature involving substance use and the fostering of purpose, to an extent that is well beyond the scope of the current study. Such research and the associated findings would be an important contribution to the existing literature in these areas, informing evidence-based interventions geared toward ameliorating the adverse circumstances experienced by those with substance use-related problems. Along these lines, new studies are currently underway to investigate aspects of EF, substance use, and rates of mental health services following the pandemic (e.g., Kim et al., 2020). Studies such as these may prove useful for understanding the various impacts that stressful environmental contexts can have on a range of EF factors, including those explored in the current study (e.g., impulsivity, self-regulatory
Stemming from the aforementioned, one factor that warrants inclusion in future studies is mental health as a possible covariate, especially given the higher rates of depression, anxiety, and posttraumatic stress following quarantine and social isolation restrictions in response to the COVID-19 global pandemic (Vindeggaard & Benros, 2020). This is largely due to the established relationships with various factors of EF including impulsivity and inattention (Bettis et al., 2017; Chamorro et al., 2012) as well as low levels of perceived purpose and/or meaning in life (Bronk & Mangan, 2016; Steger, 2012). Broadly compromised mental health may also impact one’s ability to utilize adaptive cognitive and social coping skills required to successfully manage distress that may be brought on by EF difficulties as well as discussions of purpose and meaning in life (Reker et al., 1987; Schotanus-Dijkstra et al., 2017). More specifically, symptoms of depression, anxiety, posttraumatic stress, etc. can affect one’s ability to engage in behaviors that may be meaningful because of symptom severity and frequency (Aiena et al., 2015). These risk factors for increased distress overlap with various identified risk factors for low EF capabilities. As individuals with EF deficits experience higher rates of mental health concerns than individuals without deficits in EF skills (Duggan et al., 2017), mental health is a relevant variable to consider in further explorations of distress, inability to cope effectively, and/or engagement in activities that emerging adults would like to do otherwise.

The present study was also limited by the collection of data at a single time-point prior to the establishment of university safety protocols in response to the COVID-19 global pandemic. A study design that measures both EF skills and purpose in life across multiple time-points would be highly valuable for several reasons. While various stressful life experiences can negatively impact health outcomes over time (Felitti et al., 1998), research also shows that
perceived purpose can actually increase after experiencing such events, effectively serving as a buffer. Such an outcome is often conceptualized and referred to in the literature as posttraumatic growth (PTG; Park et al., 2017; Schulenberg, 2020; Southwick & Charney, 2018; Tedeschi & Calhoun, 2004). Research also indicates that a relationship between purpose, meaning, and PTG exists among individuals that have experienced different forms of stressful life experiences (Boullion et al., 2020; McKnight & Kashdan, 2009; Weathers et al., 2013; Weber et al., 2020). As such, PTG should be considered and potentially assessed in future studies, especially considering ongoing stressors initiated by COVID-19 and that continue to the present-day (at the time of the writing of this project, the pandemic and its associated effects remain ongoing).

Despite the strong presence of existing literature examining EF and purpose in life separately, the potential for overlap between the two concepts has minimal pre-existing literature. The complexities that encompass EF are typically related more to the field of neuropsychology where brain and behavior relationships are thoroughly examined and assessed. Similarly, purpose in life is typically examined in relation to research involving existential and positive concepts, placing value on the importance of personal growth, at times following a highly stressful situation or event in life. Nevertheless, the present study provides a foundation for further exploration of the relationship between an individual’s EF capabilities and their perceived purpose in life. These preliminary findings also support the broader objective that fostering purpose among individuals as they transition from adolescence into emerging adulthood is necessary to improve well-being and quality of life.
LIST OF REFERENCES
REFERENCES


https://doi.org/10.1007/s12671-011-0057-2


https://doi.org/10.1016/j.cognition.2015.02.001


https://doi.org/10.1002/pon.2113


https://doi.org/10.1002/yd.426


https://doi.org/10.1080/17439760903271439


https://doi.org/10.1146/annurev.ne.18.030195.001205


https://doi.org/10.1111/jopy.12033


https://doi.org/10.1016/j.jcrc.2016.08.023


https://doi.org/10.1097/00004703-199508000-00004


[https://doi.org/10.1037/0012-1649.42.2.366](https://doi.org/10.1037/0012-1649.42.2.366)


https://doi.org/10.1177/0956797612444902

https://doi.org/10.1002/cd.142

https://digitalcommons.lsu.edu/gradschool_dissertations/5347

https://doi.org/10.1016/s1053-8119(03)00275-1

https://doi.org/10.1093/eurpub/ckw202


https://doi.org/10.1002/jclp.20841


https://doi.org/10.1111/j.1467-8721.2007.00475.x


APPENDICIES
Table 1.

*Full sample demographics (N = 844)*

<table>
<thead>
<tr>
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<th>Full Sample (N =844)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Female</td>
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<td>Male</td>
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<tr>
<td><strong>Mean age (SD)</strong></td>
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<tr>
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<tr>
<td>Summer employment</td>
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<td>Unemployed</td>
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<td>Part-time employment</td>
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<td><strong>Ethnicity</strong></td>
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<tr>
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<tr>
<td>Other</td>
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<tr>
<td><strong>Sexual Orientation</strong></td>
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<tr>
<td>Heterosexual (straight)</td>
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<tr>
<td>Bisexual</td>
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<tr>
<td>Gay</td>
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<tr>
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<tr>
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<td>Lesbian</td>
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<tr>
<td>Queer</td>
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<tr>
<td>Other</td>
<td>5</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>5</td>
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</table>
Table 2.

*In-lab D-KEFS sample demographics (N = 30)*

| In-Lab D-KEFS Sample (N=30) |     |  
|-----------------------------|-----|-----
|                            | n   | %   |
| **Gender**                 |     |     |
| Female                      | 20  | 66.7|
| Male                        | 10  | 33.3|
| Non-binary                  | 0   | 0   |
| **Mean age (SD)**          | 19.30 (2.04) |
| **Employment**             |     |     |
| Summer employment           | 16  | 53.3|
| Unemployed                  | 10  | 33.3|
| Part-time employment        | 4   | 13.3|
| Full-time employment        | 0   | 0   |
| **Ethnicity**              |     |     |
| White                       | 21  | 70.0*|
| Black                       | 9   | 30.0*|
| Asian/Asian-American        | 1   | 3.3 |
| Hispanic/Latino(a)          | 0   | 0   |
| Native American/Native Alaskan | 0  | 0   |
| Native Hawaiian or Pacific Islander | 0 | 0 |
| Other                       | 0   | 0   |
| **Sexual Orientation**     |     |     |
| Heterosexual (straight)     | 25  | 83.3|
| Bisexual                    | 2   | 6.7 |
| Gay                         | 0   | 0   |
| Asexual                     | 2   | 6.7 |
| Pansexual                   | 0   | 0   |
| Lesbian                     | 0   | 0   |
| Queer                       | 1   | 3.3 |
| Other                       | 0   | 0   |
| Prefer not to say           | 0   | 0   |

Notes. *One participant ethnically identified as both White and Black. D-KEFS = Delis-Kaplan Executive Functioning System.*
Table 3.  
*Descriptive statistics and reliability coefficients for online self-report measures*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Min.</th>
<th>Max.</th>
<th>M</th>
<th>SD</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BDEFS-SF</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Total EF deficits scale sum score</td>
<td>20.00</td>
<td>80.00</td>
<td>37.24</td>
<td>10.96</td>
<td>.92</td>
</tr>
<tr>
<td>Self-Management to Time subscale score</td>
<td>4.00</td>
<td>16.00</td>
<td>9.86</td>
<td>3.22</td>
<td>.86</td>
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<td>Self-Organization/Problem-Solving subscale sum score</td>
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<td>16.00</td>
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<td>16.00</td>
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<td>.78</td>
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<tr>
<td>Self-Motivation subscale sum score</td>
<td>4.00</td>
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<td>6.98</td>
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<td>.84</td>
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<tr>
<td>Self-Regulation of Emotion subscale sum score</td>
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<td><strong>SSRQ</strong></td>
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<tr>
<td>Total self-regulation summary score</td>
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<td>155.00</td>
<td>99.85</td>
<td>10.42</td>
<td>.73</td>
</tr>
<tr>
<td><strong>CPS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total purpose scale sum score</td>
<td>13.00</td>
<td>60.00</td>
<td>44.25</td>
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</tr>
<tr>
<td>Personal Meaning subscale sum score</td>
<td>4.00</td>
<td>20.00</td>
<td>14.03</td>
<td>4.01</td>
<td>.92</td>
</tr>
<tr>
<td>Goal Directedness subscale sum score</td>
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<td>20.00</td>
<td>14.48</td>
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<td>.87</td>
</tr>
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<td>Beyond-the-Self subscale sum score</td>
<td>4.00</td>
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<td>15.74</td>
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</tr>
<tr>
<td><strong>MLQ</strong></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Presence of meaning sum score</td>
<td>5.00</td>
<td>35.00</td>
<td>26.21</td>
<td>6.79</td>
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</tr>
<tr>
<td>Search for meaning sum score</td>
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<td>.89</td>
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<tr>
<td><strong>VLQ</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total valued living composite score</td>
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<td>100.00</td>
<td>54.56</td>
<td>21.43</td>
<td>.92</td>
</tr>
<tr>
<td>Importance subscale sum score</td>
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<td>120.00</td>
<td>88.66</td>
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<tr>
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<td>120.00</td>
<td>81.02</td>
<td>22.29</td>
<td>.88</td>
</tr>
</tbody>
</table>

Note. N = 844. BDEFS-SF = Barkley Deficits in Executive Functioning Scale, Short-Form. SSRQ = Short Self-Regulation Questionnaire. CPS = Claremont Purpose Scale. MLQ = Meaning in Life Questionnaire. VLQ = Valued Living Questionnaire.
Table 4. 
*Descriptive statistics and reliability coefficients for in-lab participants’ self-report measures*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Min.</th>
<th>Max.</th>
<th>M</th>
<th>SD</th>
<th>α</th>
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<tr>
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<td>80.00</td>
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<tr>
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<td>16.00</td>
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<tr>
<td>Self-Organization/Problem-Solving subscale sum score</td>
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<td>16.00</td>
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<tr>
<td>Self-Motivation subscale sum score</td>
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<td>16.00</td>
<td>5.97</td>
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<tr>
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<td>20.00</td>
<td>15.87</td>
<td>3.27</td>
<td>.92</td>
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<tr>
<td>Beyond-the-Self subscale sum score</td>
<td>4.00</td>
<td>20.00</td>
<td>17.20</td>
<td>2.76</td>
<td>.81</td>
</tr>
<tr>
<td>Presence of meaning sum score</td>
<td>5.00</td>
<td>35.00</td>
<td>27.80</td>
<td>6.60</td>
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<td>Search for meaning sum score</td>
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<td>35.00</td>
<td>25.13</td>
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<tr>
<td>Total valued living composite score</td>
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<td>100.00</td>
<td>59.54</td>
<td>19.87</td>
<td>.90</td>
</tr>
<tr>
<td>Importance subscale sum score</td>
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<td>120.00</td>
<td>91.17</td>
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<td>.83</td>
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<tr>
<td>Consistency subscale sum score</td>
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<td>120.00</td>
<td>86.13</td>
<td>22.06</td>
<td>.87</td>
</tr>
</tbody>
</table>

Table 5.  
*Descriptive statistics and in-lab participants’ D-KEFS measures (Scaled Scores)*

<table>
<thead>
<tr>
<th>D-KEFS</th>
<th>Min.</th>
<th>Max.</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color-Word Interference Test: Inhibition score</td>
<td>1.00</td>
<td>19.00</td>
<td>11.63</td>
<td>1.78</td>
</tr>
<tr>
<td>Verbal Fluency Test: Category Switching total score</td>
<td>1.00</td>
<td>19.00</td>
<td>10.60</td>
<td>3.55</td>
</tr>
<tr>
<td>Sorting Test: Combined Description score</td>
<td>1.00</td>
<td>19.00</td>
<td>9.43</td>
<td>2.32</td>
</tr>
</tbody>
</table>

Table 6.  
*Bivariate Pearson correlations for primary outcomes*

<table>
<thead>
<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BDEFS-SF Total Scores</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. SSRQ Summary Scores</td>
<td>.310**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. CPS Total Scores</td>
<td>-.419**</td>
<td>.061*</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. MLQ-P Scores</td>
<td>-.381**</td>
<td>.016</td>
<td>.751**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5. VLQ Composite Scores</td>
<td>.212**</td>
<td>.017</td>
<td>.437**</td>
<td>.401**</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes. *N* = 844. ** *p* < .01, * *p* < .05. BDEFS-SF = Barkley Deficits in Executive Functioning Scale, Short Form. SSRQ = Short Self-Regulation Questionnaire. CPS = Claremont Purpose Scale. MLQ-P = Meaning in Life-Presence subscale. VLQ = Valued Living Questionnaire.
Table 7.
Results from regression analyses of BDEFS-SF subscale scores on CPS Total Scores

<table>
<thead>
<tr>
<th>BDEFS-SF – Subscale</th>
<th>β</th>
<th>t(843)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDEFS-SF – Self-Management to Time</td>
<td>-.40</td>
<td>-3.80</td>
<td>.000**</td>
</tr>
<tr>
<td>BDEFS-SF – Self Organization/Problem Solving</td>
<td>.04</td>
<td>.31</td>
<td>.757</td>
</tr>
<tr>
<td>BDEFS-SF – Self-Restraint</td>
<td>-.21</td>
<td>-1.49</td>
<td>.138</td>
</tr>
<tr>
<td>BDEFS-SF – Self-Motivation</td>
<td>-.86</td>
<td>-6.44</td>
<td>.000**</td>
</tr>
<tr>
<td>BDEFS-SF – Self-Regulation of Emotion</td>
<td>-.08</td>
<td>-.77</td>
<td>.440</td>
</tr>
</tbody>
</table>

Notes. N = 844. ** p < .01, * p < .05. BDEFS-SF = Barkley Deficits in Executive Functioning, Short Form. CPS = Claremont Purpose Scale.
Table 8. Results from regression analyses of D-KEFS subtest scores on CPS Total Scores

<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>t(29)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-KEFS – Color-Word Interference Test: Inhibition Score</td>
<td>.18</td>
<td>.207</td>
<td>.838</td>
</tr>
<tr>
<td>D-KEFS – Verbal Fluency: Switching Category Score</td>
<td>.66</td>
<td>1.42</td>
<td>.167</td>
</tr>
<tr>
<td>D-KEFS – Sorting Test Score</td>
<td>-.80</td>
<td>-1.14</td>
<td>.267</td>
</tr>
</tbody>
</table>

Notes. \( N = 30 \). ** \( p < .01 \), * \( p < .05 \). CPS = Claremont Purpose Scale. D-KEFS = Delis-Kaplan Executive Functioning System.
Table 9.
Correlation analyses for SSRQ Summary Scores and D-KEFS Color-Word Interference Test: Inhibition Scores

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SSRQ Summary Scores</td>
<td>100.93</td>
<td>5.67</td>
<td></td>
</tr>
<tr>
<td>2. D-KEFS Color-Word Interference Test: Inhibition Scores</td>
<td>11.63</td>
<td>1.78</td>
<td>0.193</td>
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</tbody>
</table>

Table 10. Results from regression analyses of CPS subscale scores on MLQ-P scores

<table>
<thead>
<tr>
<th>CPS subscale</th>
<th>β</th>
<th>t(843)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPS – Personal Meaning subscale</td>
<td>1.28</td>
<td>32.04</td>
<td>.000**</td>
</tr>
<tr>
<td>CPS – Goal-Directedness subscale</td>
<td>.18</td>
<td>3.60</td>
<td>.000**</td>
</tr>
<tr>
<td>CPS – Beyond-the-Self subscale</td>
<td>.16</td>
<td>3.89</td>
<td>.000**</td>
</tr>
</tbody>
</table>

Notes. N = 844. ** p < .01, * p < .05. CPS = Claremont Purpose Scale. MLQ-P = Meaning in Life-Presence.
Appendix A: Information on the study and consent

Study title: Executive functioning and purpose in life among emerging adults in college

Investigator
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Description
We are interested in seeing how an individual’s level of executive functioning can influence their levels of perceived purpose in life throughout emerging adulthood. You will also see questions about your ability to self-regulate your behaviors. You can take the survey online using a smartphone, tablet, or computer. Following the online portion of the administration, you will be asked to come to the lab to complete the in-person portion of the study. During this appointment, you will be administered three assessments of executive functioning by a qualified researcher.

Risks and Benefits
By answering the questions, you may experience uncomfortable thoughts about your experiences and/or adverse effects from contemplating important areas of your life or after completing the assessments of executive functioning. Please be aware of your surroundings and choose a private location to complete the online survey if you do not want the answers you give to be seen by those around you.

You will receive 1 hour of research credit for the first time you participate and 2 more for completing the in-person administration. Many people enjoy taking surveys and may feel good about participating in a project aimed to develop new ways of helping other college students that may have some executive functioning difficulties or fostering purpose in their life.

Costs and Payments
The online survey may take approximately 20-30 minutes to complete. Your name will be submitted through an interface that is independent of the study questionnaires, so it will NOT be linked to your responses. The in-person portion may take approximately 60-90 minutes to complete. There will be no other costs or payments for participating.
Confidentiality
Your name and email address will not be on, or connected to, any of your survey responses. We cannot associate the data collected from the survey with your name or email address in any way. Therefore, you will not be identified from any of your answers.

Right to Withdraw
You do not have to take part in this study. If you start the study and decide that you do not want to finish, you can choose to exit the survey. There will be no penalty for discontinuing the survey.

IRB Approval
This study was submitted for review to The University of Mississippi’s Institutional Review Board (IRB). The IRB has determined that this study fulfills the human research subject protections obligations required by state and federal law and University policies. If you should have any questions, please contact the IRB at (662) 915-7482 or irb@olemiss.edu.

Statement of Consent
Please select one of the statements below:

- I certify that I am 18 years of age or older, have read the above information and consent to participate in this study.

- I do NOT wish to participate in this study. → skip to the end of the survey

Participant ID

In order to keep track of your responses while keeping your information anonymous, we would like you to answer the following questions.

ID1. Please enter the month and day of your birth date using two digits for the month and two digits for the day (e.g., May 5 = 0505).
   (Text box that only allows numerical entry)

ID2. What are the last four digits of your FIRST phone number?
   (Text box that only allows numerical entry)
APPENDIX B: Demographics

Demographics

1. Are you between the ages of 18 and 29 years old?
   _Yes _No → skip to the end of the survey

2. How do you identify?
   _Male _Female _Non-binary _Other (text box)

3. What is your race/ethnicity? (Check all that apply)
   _European American/White _African American/Black _Asian American
   _Native American Indian/First Nations/Alaska or Native Hawaiian
   _Hispanic/Latino(a) _Other (text box)

4. Where are you from? (Dropdown list of countries with U.S. first, then alphabetical order
   (this is a Qualtrics pre-set)
   3.b. If from the U.S. → What state are you from? (Dropdown list in alphabetical order)

5. How do you identify? (Check all that apply)
   _Heterosexual _Gay _Lesbian _Bisexual _Transgender
   _Asexual _Pansexual _Queer _Other (text box)

6. What is your religious affiliation?
   _Christian → 5B. _Catholic _Protestant _Other Christian (text box)
   _Jewish _Muslim _Buddhist _Hindu
   _Atheist _Agnostic _Undecided _Other (text box)

7. What is your employment status?
   _Full time work during the school year
   _Part time work during the school year → 7B. Are you doing work study? _Yes _No
   _I work in the summers only

8. What is your education status?
   _Full time _Part time

9. What is your year in school?
   _Freshman _Sophomore _Junior _Senior _Other (text box)

10. Where do you live?
    _On-campus → 10A. _Dorm → 10B. Are you a C.A. (Community Assistant)? _Yes _No
    _Sorority house _Apartment _Special interest housing
    _Off-campus → 10C. _Apartment _House _Other (text box)

11. Have you ever been diagnosed with a developmental disorder or medical condition (e.g.,
    ADHD, Autism Spectrum Disorder, brain tumor, epilepsy, etc.)?
_Yes → 11A. Which diagnosis or diagnoses have you ever been clinically diagnosed with having by a medical physician, psychiatrist or psychologist? Please check all that apply.

Attention-Deficit/Hyperactivity Disorder (ADHD)  _Autism  _Asperger Syndrome  _Dyslexia  _Dysgraphia  _Brain tumor  _Leukemia  _Epilepsy  _Other (text box)  _Prefer not to disclose

_No
APPENDIX C: Barkley Deficits in Executive Functioning Scale, Short Form (BDEFS-SF; Barkley, 2011)

*Attention check item will be placed between items 9 and 10: “Please select 4 for this item.”

Example of BDEFS-SF removed due to copyright
APPENDIX D: Short Self-Regulation Questionnaire (SSRQ; Neal & Carey, 2005)

Directions: Please answer the following questions by circling the response that best describes how you are. Remember, there are no right or wrong answers.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Uncertain or Unsure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1. I usually keep track of my progress towards my goals.
2. I have trouble making up my mind about things.
3. I get easily distracted from my plans.
4. I don’t notice the effects of my actions until it is too late.
5. I am able to accomplish goals I set for myself.
6. I put off making decisions.
7. It’s hard for me to notice when I’ve “had enough” (alcohol, food, sweets).
8. If I wanted to change, I am confident that I could do it.
9. When it comes to deciding about a change, I feel overwhelmed by the choices.
10. Please select 4 for this item.*
11. I have trouble following through with things once I’ve made up my mind to do something.
12. I don’t seem to learn from my mistakes.
13. I can stick to a plan that’s working well.
14. I usually only have to make a mistake one time in order to learn from it.
15. I have personal standards, and try to live up to them.
16. As soon as I see a problem or challenge, I start looking for all possible solutions.
17. I have a hard time setting goals for myself.
18. I have a lot of willpower.
19. When I’m trying to change something, I pay a lot of attention to how I’m doing.
20. Please select 4 for this item.*
21. I have trouble making plans to help me reach my goals.
22. I am able to resist temptation.
23. I set goals for myself and keep track of my progress.
24. Most of the time I don’t pay attention to what I’m doing.
25. I tend to keep doing the same thing, even when it doesn’t work.
26. I can usually find several different possibilities when I want to change something.
27. Once I have a goal, I can usually plan how to reach it.
28. If I make a resolution to change something, I pay a lot of attention to how I’m doing.*
29. Often I don’t notice what I’m doing until someone calls it to my attention.
30. I usually think before I act.
31. I learn from my mistakes.
32. I know how I want to be.
33. I give up quickly

*Attention check item
**APPENDIX E: Claremont Purpose Scale (CPS; Bronk, Riches, & Mangan, 2018)**

### Meaningfulness

1. How clear is your sense of purpose in your life?
   - Not at all clear
   - A little bit clear
   - Somewhat clear
   - Quite clear
   - Extremely clear

2. How well do you understand what gives your life meaning?
   - Do not understand at all
   - Understand a little bit
   - Understand somewhat
   - Understand quite well
   - Understand extremely well

3. How confident are you that you have discovered a satisfying purpose for your life?
   - Not at all confident
   - Slightly confident
   - Somewhat confident
   - Quite confident
   - Extremely confident

4. How clearly do you understand what it is that makes your life feel worthwhile?
   - Not at all clearly
   - A little bit clearly
   - Somewhat clearly
   - Quite clearly
   - Extremely clearly

### Goal orientation

5. How hard are you working to make your long-term aims a reality?
   - Not at all hard
   - Slightly hard
   - Somewhat hard
   - Quite hard
   - Extremely hard

6. How much effort are you putting into making your goals a reality?
   - Almost no effort
   - A little bit of effort
   - Some effort
   - Quite a bit of effort
   - A tremendous amount of effort

7. How engaged are you in carrying out the plans that you set for yourself?
   - Not at all engaged
   - Slightly engaged
   - Somewhat engaged
   - Quite engaged
   - Extremely engaged

8. What portion of your daily activities move you closer to your long-term aims?
   - None of my daily activities
   - A few of my daily activities
   - Some of my daily activities
   - Most of my daily activities
   - All of my daily activities

### Beyond-the-self dimension

9. Please select *Once in a while* for this item.*
   - Almost never
   - Once in a while
   - Sometimes
   - Frequently
   - Almost all the time

10. How often do you hope to leave the world better than you found it?
    - Almost never
    - Once in a while
    - Sometimes
    - Frequently
    - Almost all the time

11. How often do you find yourself hoping that you will make a meaningful contribution to the broader world?
    - Almost never
    - Once in a while
    - Sometimes
    - Frequently
    - Almost all the time

12. How important is it for you to make the world a better place in some way?
    - Not at all important
    - Slightly important
    - Somewhat important
    - Quite important
    - Extremely important

13. How often do you hope that the work that you do positively influences others?
    - Almost never
    - Once in a while
    - Sometimes
    - Frequently
    - Almost all the time

*Attention check item*
APPENDIX F: The Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006)

Directions: Please take a moment to think about what makes your life feel important to you. Please respond to the following statements as truthfully and accurately as you can, and also please remember that these are very subjective questions and that there are no right or wrong answers. Please answer according to the scale below:

<table>
<thead>
<tr>
<th>Absolutely Untrue</th>
<th>Mostly Untrue</th>
<th>Somewhat Untrue</th>
<th>Can’t Say</th>
<th>Somewhat True</th>
<th>Mostly True</th>
<th>Absolutely True</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

1. I understand my life’s meaning.
2. I am looking for something that makes my life feel meaningful.
3. I am always looking to find my life’s purpose.
4. My life has a clear sense of purpose.
5. I have a good sense of what makes my life meaningful.
6. I have discovered a satisfying life purpose.
7. I am always searching for something that makes my life feel significant.
8. I am seeking a purpose or mission for my life.
9. My life has no clear purpose. *
10. I am searching for meaning in my life.

* Reverse scored
Presence subscale: items 1, 4, 5, 6, and 9
Search subscale: items 2, 3, 7, 8, and 10
APPENDIX G: Valued Living Questionnaire (VLQ; Wilson, Sandoz, & Kitchens, 2010)

Below are domains of life that are valued by some people. We are concerned with your subjective experience of your quality of life in each of these domains. One aspect of quality of life involves the importance one puts on the different domains of living. Rate the importance of each domain on a scale of 1 to 10. Not everyone will value all of these domains, or value all domains the same. Rate each domain according to your own personal sense of importance. **DURING THE PAST WEEK: (1 = Not at all important, 10 = Very important).**

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In this section, we would like you to give a rating of how consistent your actions are with each value. Everyone does better in some domains than others. We are NOT asking about your ideal in each domain. We want to know how you think you have been doing during the **past week**. Rate each item on a scale of 1 to 10; 1 means that your actions have been fully inconsistent with your value, and 10 means that your actions have been fully consistent with your value. **DURING THE PAST WEEK:** (1 = your actions have been fully inconsistent with your value, 10 = your actions have been fully consistent with your value).

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APPENDIX H: Survey final messages

In order to receive one (1) credit for the online portion of your research participation, you must enter your first and last name here, as it is written in the SONA system. For additional two (2) credits, you may schedule an in-person appointment by following the link on the next page to schedule the your in-person session on the SONA system entitled “Executive Functioning and Purpose in Life Among Emerging Adults in College – In-Person Session.” If you complete both the online and in-person portions of this study, then you will receive a total of 3 research credits.

Your name: (Text box for entering name)

Next page:
Your response has been recorded. If you have any questions, please do not hesitate to contact the primary researcher, Alexis Liberto at aklibert@go.olemiss.edu.

Click here to be redirected to the SONA system portal and schedule an in-person appointment session for an additional 2 credits: (link to SONA study list will be inserted here)
APPENDIX I: SONA Announcement

Study Title:
Executive Functioning and Purpose in Life Among Emerging Adults in College

Investigator:
Alexis K. Liberto

Description:
We are conducting research to better understand how individuals’ level of executive functioning may play a role in their ability to conceptualize purpose in their life. This study will first involve completing an online survey that will take no longer than 30 minutes. After completion of the survey, you will be asked to schedule and attend an in-person session where you will be administered three (3) executive functioning tasks. The in-session portion should take no longer than 75 minutes to complete.

Eligibility Requirements:
Must be 18 years or older
Must be under the age of 30 years
Must have access to a smartphone

Credit:
1 hour of research credit for completion of online survey portion
2 hours of research credit for completion of in-person portion
VITA

Education

07/2021  Clinical Psychology Pre-Doctoral Internship
Rochester Institute of Technology – Priority Behavioral Health Internship
Consortium – Rochester, NY

05/2015  Master of Arts in Experimental Psychology
St. John’s University – Queens, NY

05/2012  Bachelor of Arts in Psychology
Hawai‘i Pacific University – Honolulu, HI

Publications


Presentations


**Graduate Student Stewardship**

Graduate Student Memberships
- International Society for Traumatic Stress Studies
- American Psychological Association
- Psi Chi, National Honor Society in Psychology
- Society of Clinical Child and Adolescent Psychology (SCCAP) – Division 53
- Society of Pediatric Psychology (SPP) – Division 54
- Society of Personality and Social Psychology (Previously)

University of Mississippi
2019 Clinical Psychology Graduate Student Representative for the Faculty
Department of Psychology Communications Committee
2015-2017 President / Autism Speaks U – Ole Miss

Volunteer
- Organization and Management Team / LA MISS ACBS Conference with Legacy Track with Kelly Wilson
  - *Louisiana Mississippi Association of Contextual Behavior Science / July 2019*

**Honors and Awards**

2011-2012 Dean’s List, Hawai‘i Pacific University
2010-2012 President Host Student Representative, Hawai‘i Pacific University
2008-2012 Dance Team Tuition Scholarship, Hawai‘i Pacific University