# WHEN IT'S TIME TO THROW IN THE TOWEL: EXAMINING GOAL PURSUIT AND DEPRESSION FROM AN EVOLUTIONARY PERSPECTIVE

**Amanda Leonhard**

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Advisor: Keelah Williams

Abstract

Modern rates of depression are high and following an upward trend. Positive and negative affect are supposed to serve as motivators to guide behavior, such as engaging in fruitful goals and disengaging from unproductive ones. However, evolutionary time lag has left humans with the task of navigating a world for which they did not evolve. One of the most salient differences between today's world and ancestral conditions is the advent of mass communication, which allows for upward social comparison on a global scale. This study explored the role of social comparison in the failure to disengage from unproductive goals. I hypothesized that participants ($N = 97$) given upward social comparison information would spend the greatest amount of time trying to solve impossible anagrams, participants who received no social comparison information would spend the second most amount of time, and participants given downward social comparison information would spend the least amount of time. Additionally, I predicted that time spent on the anagrams would be positively correlated with social anxiety, public self-consciousness, and need for social desirably, and negatively correlated with self-esteem and private self-consciousness. Results supported the main hypothesis: Participants in the upward social comparison condition spent more time on the impossible anagrams than participants in the control and downward social comparison conditions. However, this effect was not driven or shaped by any of the individual difference variables measured. Future studies should therefore explore the mechanism behind social comparison information preventing disengagement.

# When it's Time to Throw in the Towel: Examining Goal Pursuit and Depression from an Evolutionary Perspective

Why can't we be happy? Humans in the modern world enjoy an unprecedented increase in life expectancy, with incredible advances in medicine and the eradication of many deadly diseases. Physical well-being is at its peak, but mental health outcomes have followed a very different trajectory. Rates of depression have been increasing throughout the 20th century, including an earlier age of onset (Klerman, 1985). People born in the middle of the 20th century were 10 times as likely to have major depression than those born in the first third (Klerman, 1985). More recent data suggest that feelings of depression, acts of self-injury, suicidal ideation, and suicide attempts among college students have increased 34%, 47%, 81%, and 58%, respectively, in just the 12-year span from 2007-2019 (Duffy, Twenge, & Joiner, 2019). These alarming statistics present a challenge to researchers because depression rates have risen despite efforts on the part of the multi-billion-dollar pharmaceutical industry. Yet, the SSRIs flowing plentifully throughout the veins of many in our society have failed to halt the ever-increasing rates of depression. Perhaps neurochemistry alone cannot account for the full story.

This paper approaches the phenomenon of rising depression rates from an evolutionary perspective, positing that modern people engage in maladaptive behaviors that may lead to depression in part because today's environment differs drastically from the one in which humans evolved. In particular, I explore the tendency for individuals to persist in futile goals despite receiving motivational cues (low mood) that should lead to disengagement. Expanding upon the previous research that describes how people pursue goals, I propose that this low mood builds over time until the person experiences full-blown, clinical depression. It is at this point that total disengagement from goals finally occurs. This paper also examines the potential reasons behind

the failure to disengage. In particular, I propose that social comparison may drive individuals to continue pursuing an impossible task.

## Goal Pursuit

One of the most fundamental aspects of human evolution is the fact that everything is a trade-off. Energy is finite. When an organism chooses to allocate energy into pursuing one task, that necessarily takes away energy from a different task (Del Giudice, Gangestad, & Kaplan, 2015). For example, if a human decides to pursue a meal, this leaves less time and energy for pursuing a mate. The concept is not unfamiliar even in today's world, where many people find themselves choosing between activities such as working, socializing, cooking, cleaning, and sleeping in a given day. It can't all be done at once, so how does one choose?

An organism's job is to pursue the goals that yield the greatest reward per unit of energy expended (Del Giudice, Gangestad, & Kaplan, 2015). Optimal foraging theory is an example of this concept. Because an animal must often travel at least some distance to find food, it needs to weigh the cost of traveling against the reward of obtaining food, all the while knowing when to stop traveling or not make the trip in the first place (Charnov, 1976). As Nesse (2004) points out, this concept can be summed up in terms of three crucial abilities for optimal chances of survival. First, the organism must choose to exert the correct amount of energy to accomplish the task, erring on the minimum. Second, it must decide to stop an activity when some other activity will offer a greater payoff per resource unit. Last, the organism must choose which subsequent activity would be most appropriate for overall fitness (Nesse, 2004). These decisions can all be regulated via emotions—i.e., affective feedback.

**Incentive-disengagement cycle.** According to the incentive-disengagement cycle, organisms are motivated to approach or discard goals via affective feedback (Klinger, 1975). When an organism is making progress towards achieving a reward, a positive mood will

motivate continued engagement. However, when an organism is not making progress and pursuing the goal is becoming a waste of time and resources, a negative mood will promote disengagement to free up energy for a more fruitful task (Klinger, 1975). Picture a tall tree sprouting plentiful fruit in its upper branches. An ancestral human spots this potential source of nourishment, and decides to try to climb the tree. If they are making successive progress toward reaching the top of the tree, they will feel happy and thus want to continue climbing. However, if despite great effort they are not making any progress in climbing the tree, they will feel sad, unmotivated, and want to find food somewhere else. It would be a waste of time and energy to spend all day and night trying to climb an unclimbable tree.

When a person fails to disengage from an ineffectual goal despite continued low mood, depression can arise (Nesse, 2004). It is maladaptive for a person to ignore affective feedback. It is like continuing to sit in a house as the smoke alarms are blaring and smoke is filling the rooms. Gut (1989) argues that the averseness of depressive symptoms is to be respected as an alarm that something is awry in the organism's life and changes need to be made. In this way, depressive symptoms are adaptive when they motivate an individual to move on from a futile goal (Dickson, Moberly, O'Dea, & Field, 2016; Koppe & Rothermund, 2017). In fact, among young adults who reported difficulty with giving up on an unobtainable goal, disengagement and subsequent reengagement in new goals was associated with high ratings of subjective well-being (Wrosch et al., 2003). Furthermore, when feelings of self-worth are contingent on achieving a particular goal, and there is a large discrepancy between one's desired and actual state (i.e., not being able to achieve a goal), the person loses an important source of self-worth (Pyszczynski & Greenberg, 1987). To compound the already-present negative affective feedback, the individual will spiral down into a pattern of intensive self-focus, with tunnel vision locked on negative outcomes and little attention given to positive outcomes (Pyszczynski & Greenberg, 1987). This "depressive

self-focusing style" helps maintain the original low mood and exacerbate it into depression (Pyszczynski & Greenberg, 1987).

**Low mood versus depression.** However, it is important to note that not all goals are the same. If affect serves an adaptive function in regulating motivational behavior, it would need to be more nuanced than the simple binary of "happy" or "sad." For example, hunting down a rabbit for dinner and seeking affection from a potential mate occupy two different fundamental categories, and thus natural selection would have shaped different kinds of emotions to specialize in addressing different kinds of tasks (Nesse & Ellsworth, 2009). To test this idea, Keller and Nesse (2004) administered a survey to 920 undergraduate students who were pre-screened for having experienced a period of low mood. The researchers were then able to determine if any particular symptoms were associated with types of precipitating events. They found that death and romantic losses were associated with crying and sadness. Social isolation was associated with crying, sadness, and self-reproach (i.e., feelings of worthlessness and guilt). Low mood from the winter weather was associated with fatigue and pessimism. Finally, and most relevant for the current paper, failed goals were associated with self-reproach, pessimism, and fatigue (Keller & Nesse, 2004).

These feelings of low mood must be distinguished from clinical depression. For example, a study by Devos, Clark, Maurage, and Billieux (2018) examined gambling behaviors in participants who were experimentally induced to feel sadness (i.e., low mood). Compared to the control group, these sad participants displayed greater gambling persistence despite not winning, supporting the notion that some people do in fact fail to disengage from goals even with continued negative affect (Devos et al., 2018). In contrast, another study examined goal pursuit behavior in clinically depressed adults (Dickson, Moberly, O'Dea, & Field, 2016). Participants recruited from therapy clinics generated goals and completed self-report measures about the

likelihood of goal attainment and their levels of engagement. Compared to the control group, the depressed participants reported a greater ease of disengagement from unattainable goals and a greater difficulty in engaging with new goals (Dickson et al., 2016). Koppe and Rothermund (2017) explored a similar question, but via an experimental manipulation. Clinically depressed inpatients and people without depression were tasked with solving impossible anagrams. The researchers found that the depressed participants spent less time trying to solve the anagrams than those without depression, and thus concluded that their depression was serving the adaptive function of terminating wasteful activities (Koppe & Rothermund, 2017). The contrasting results of the Devos et al. (2018) study with the Dickson et al. (2016) and Koppe and Rothermund (2017) studies provide evidence that mere sadness affects behavior in a different way than clinical depression.

**The Goal Pursuit and Depression Model**

As described above, affective states can regulate behavior by motivating or demotivating organisms to pursue goals (Klinger, 1975). Once a person has decided to expend effort towards achieving a goal, environmental feedback will indicate whether progress is being made or not. If the goal seems reasonably in sight, positive affect serves the adaptive function of motivating continued engagement so that the person completes their goal (See Fig. 1., Path A). But, if time and energy are being poured into a bottomless pit with no return on investment, then negative affect motivates disengagement to free up engagement with a new, more fruitful goal (See Fig. 1., Path B). Sometimes, however, engagement persists despite the person clearly experiencing negative affect (See Fig. 1., Path C). Although this low mood can manifest in different ways, such as guilt, feelings of worthlessness, pessimism, and fatigue, it is distinct from a clinical diagnosis of depression (Keller & Nesse, 2004). As the person continues to dump effort into an impossible task (i.e., repeats Path C), the low mood is maintained, built, and eventually manifests

as actual depression (Pyszczynski & Greenberg, 1987). It is as this point that disengagement finally occurs, as the disorder inhibits an individual's ability to navigate daily life (Dickson et al., 2016; Koppe & Rothermund, 2017). But why do some people fail to disengage in the first place?

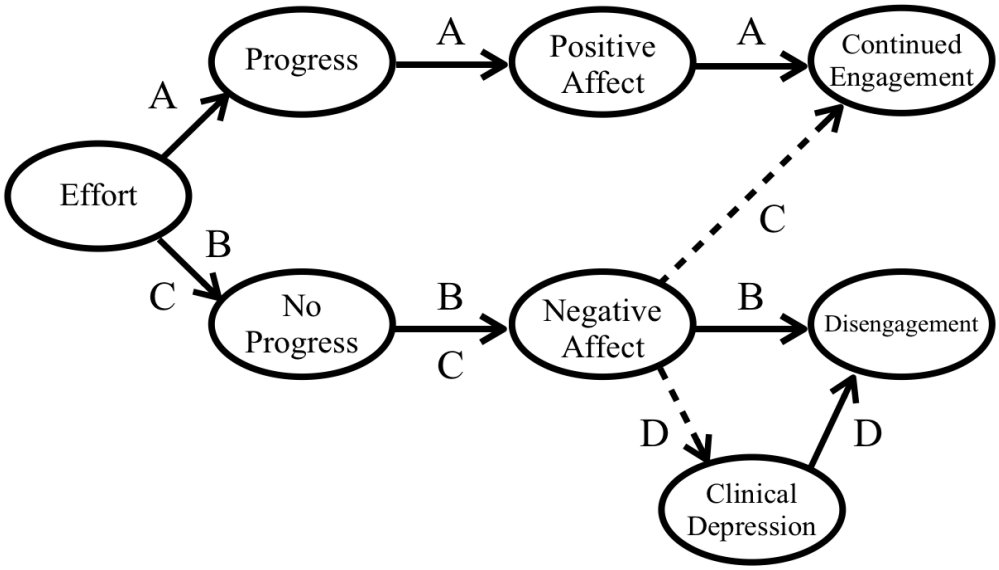


*Figure 1*. Affect motivates goal engagement (Path A) or disengagement (Path B), and repeated failure to disengage despite negative affect (Path C) can eventually lead to depression (D). Solid lines represent adaptive pathways, and dotted lines represent maladaptive pathways.

**Failure to Disengage**

The fact that many people do manage to follow the adaptive pathway of responding to affective feedback during goal pursuit suggests that the failure to disengage may be due to some unique, individual circumstances.

**External environment.** One example is that a person's external environment may contribute to the maintenance of effort in goal pursuit. In a recent field study, Dai et al. (2018) analyzed 328,515 professional tennis matches and found that players who were expected to win were significantly more likely to quit after losing the first set than the "underdogs." The researchers replicated these findings in the lab and concluded that individuals who face high expectations are quicker to quit following an early setback because they are embarrassed by poor performance (Dai et al., 2018). These results are consistent with data demonstrating that people who pursue goals with the motivation of avoiding failure are less persistent after experiencing failure than people who pursue goals with the motivation to succeed (Weiner, 1965). Another study examining perfectionism in college athletes found that individuals who could not withdraw from lofty goals failed to do so out of the fear of shame and failure, especially among those who lacked general coping mechanisms that would help a person deal with negative consequences (Elison & Partridge, 2012). These results contradict those found by Dai et al. (2018) and Weiner (1965), demonstrating that there is a key difference between being fearful of a setback and actually experiencing a setback, with the latter promoting disengagement.

**Personal cognitive habits.** Beyond external environments, an individual's personal cognitive habits may also cause sustained effort toward a futile goal. For example, a person's tendency to ruminate is positively correlated with the likelihood of getting stuck while trying to solve impossible anagrams (Van Randenborgh, Hüffmeier, LeMoult, & Joormann, 2010). This idea was also replicated experimentally via inducing participants to ruminate by asking them to

focus on their self, personality, and goals in life (Van Randenborgh et al., 2010). Participants in the rumination condition were more likely to continue trying to solve the impossible anagrams, refusing to give up, than the participants in the control condition (Van Randenborgh et al., 2010). Although thoughtful assessment of a problem can be helpful up to a certain point, continued reflections that become obsessive end up being dysfunctional (Van Randenborgh et al., 2010).

**Self-awareness.** People also vary in their level of awareness of about their behaviors and abilities. For example, people who have high levels of private self-consciousness (i.e., the ability to introspectively evaluate oneself) are more likely to withdraw effort from a task when achievement probability is unfavorable than those who have low levels of private self-consciousness (Wrosch, Scheier, Carver, & Shulz. 2003). Public self-consciousness, a person's awareness of how they are perceived by other people, is another important personal dimension. Social norms can help influence what type of goals people tend to pursue in particular situations and life stages (Hagestad, 1990; Neugarten, 1969). It may be more difficult to let a fruitless endeavor go if others in the social setting see continued pursuit as typical and appropriate (Wrosch, Scheier, Carver, & Shulz, 2003). For example, college may not be the right path for everyone, but someone who lives in a community where the vast majority of young adults attend college may feel more pressure to continue pursuing higher education than someone who lives in a community where college attendance is rare. People who are particularly sensitive to these normative pressures, such as those with high levels of public self-consciousness and social desirability, may have a more difficult time disengaging from socially accepted goals (Wrosch, Scheier, Carver, & Shulz, 2003).

**Goal variation.** Last, variation in people's ability to disengage may also be due to variation in the goals themselves. Trivial goals are easier to forsake, whereas important goals are hard to leave behind. One reason for this is because abandoning important goals can lead to

feelings of failure, resulting from losing core values of the self (Wrosch, Scheier, Carver, & Shulz, 2003). A person may tie their identity to his or her career—for example, tying who they are as a person to completing the goal of becoming a doctor. But having alternative goals to pursue that could replace this loss would facilitate disengagement (Wrosch, Scheier, Carver, & Shulz, 2003). Yet, it becomes harder to change goals as the size of the goals increases. Certain goals in our society can take years or even decades to achieve. For instance, pursuing a career as a physician requires one to get through four years of college, four years of medical school, and four years of residency. If such a goal is not working out, it may be difficult or even impossible to give up and start fresh from both a psychological and practical standpoint (Nesse, 1999). A contributing factor here is the sunk-cost effect, an irrational economic behavior that causes people to feel the need to continue engaging in a task once they have already invested money, effort, or time because they feel as though they've gone too far to turn back (Arkes & Ayton, 1999). People may continue pursuing fruitless goals simply because they think that there is nothing else that can be done (Nesse, 1999). However, it wasn't always this way. In the ancestral conditions in which humans evolved, goals were relatively straightforward and either happened or not within a relatively short amount of time. For example, a human would either be successful in finding food or not within a matter of days (Nesse, 1999). Courting a mate was a process that lasted months, at most (Nesse, 1999). Humans evolved to tackle goals of these sizes just fine. The problem is that the goals have changed, and humans have not.

**Evolutionary Time Lag**

It is no secret that evolution is a slow process. It took about six million years to get human beings to the point at which the species is today ("Human Evolution," 2019). The environment, however, can change rapidly. Just 10 generations of people have lived since the onset of the industrial age (Lambert, 2006). Only 66 years separate the first successful airplane

flight and humans landing on the moon ("Wright and Apollo," 2019). Clearly, since ancestral times, humanity has made leaps and bounds in terms of technological advancements that vastly improve the quality of our lives. We have come a long way from spending our days fleeing predators and surviving meal to meal. Unfortunately, however, natural selection simply cannot keep up.

Termed evolutionary time lag, this phenomenon explains how today's humans were never "built" to live in today's world, but rather that of our ancestors, where natural selection shaped our species over 500,000 generations of hunter-gatherers (Lambert, 2006). Thus, the many great changes that modern life has brought also created conditions for which humans did not originally evolve (Buss, 2000). Buss (2000) posits that this mismatch can result in psychological consequences such as depression. It would take millions more years for the human species to "catch up" to the modern world. In the meantime, we must navigate an environment we aren't necessarily suited for, with depression being one of the consequences that comes with this challenge. In the following paragraphs, I review a number of features of modern environments that starkly contrast with ancestral environments.

**Group size and network.** Humans evolved in small, tight-knit kin groups composed of genetic networks including parents, grandparents, siblings, uncles, aunts, cousins, nephews, and nieces (Buss, 2000). Ancestral humans thus benefited from having ties to so many individuals with inclusive fitness motivations (Buss, 2000). In the interest of passing on the family genes, relatives would often seek justice on a wronged kin member's behalf or even make the effort to provide protection. Today, that job is mostly assumed by the police and the courts (Buss, 2000). Modern kin groups are typically isolated, nuclear families that operate as lone units. Yet, humans did not evolve to navigate the world alone, and being forced to do so may indeed lead to the psychological consequence of depression.

**Close friendships.** Not only are relatives an important aspect of an individual's social network, but friends are, too. Through reciprocal altruism, friendships can yield more benefits than costs (Trivers, 1971). A friend may help an individual find food or be supportive in times of distress. However, it is important that a person does not waste resources maintaining a friendship that is merely superficial and won't provide any mutual return on investment (Trivers, 1971). One way of finding out how deep a friendship goes is via a feedback mechanism in which one observes how a friend responds to us when we experience a personal tragedy or extremely difficult circumstance. Buss (2000) deems such instances "critical events" that allow us to assess who is deeply engaged in our welfare and who is merely a "fair-weather" friend. Interestingly, the technological developments of modern life that make us more comfortable, such as better nutrition, healthcare, and shelter, might also be contributing to our demise by depriving people of the critical events that establish these deep connections (Buss, 2000). This can lead to an increase in feelings of loneliness and a decrease in deep social bonds, even despite the actual presence of friends (Buss, 2000).

**Access to social information.** Not only did our ancestors live amongst small networks with close friends and relatives, but access to other kin groups was limited by geography and transportation. Today, many people live in cities surrounded by thousands or even millions of people. In fact, anyone with an internet connection has communicatory access to *billions* of people across the entire planet. The constant barrage of information about other people—their lives, their accomplishments, and their relationships—may surely leave one feeling like the grass is greener on the other side. For example, an ancestral human had a limited pool of mates from which to choose. A modern human, however, can compare anyone they meet to the existence of celebrities, supermodels, and Olympic athletes.

Studies have shown that constantly comparing your mate with the unobtainable can lead

to reduced feelings of satisfaction and commitment (Kenrick, Gutierres, & Goldberg, 1989; Kenrick, Neuberg, Zierk, & Krones, 1994). For example, Kenrick et al. (1989) conducted an experiment in which college students were shown either control stimuli (e.g., abstract art) or photographs from a popular erotic magazine, after which all participants viewed a photograph of a nude female. Those who had previously viewed the erotic magazine photos judged the target photograph as less sexually attractive than did the control group. Another experiment had men evaluate their current relationships after being exposed to female targets of varying physical attractiveness (Kenrick et al., 1994). Compared to the men exposed to average women, the men exposed to attractive women rated their relationships less favorably (Kenrick et al., 1994). Furthermore, intrasexual comparison can also lead to decreased levels of self-esteem in women (Gutierres, Kenrick, & Partch, 1999). For example, in one study, women who were exposed to highly physically attractive women rated themselves as having lower mate value than the women in the control group (Gutierres et al., 1999). Importantly, the researchers point out that their findings suggest that this is an effect caused by changes in the perceived pool of competition, not direct changes in self-perception (Gutierres et al., 1999). Seeing what else is out there does not actually make a person less adequate, but *seemingly* less adequate by comparison. As Nesse and Williams (1994) put it, mass communication turns the planet into one big, competing group. Now, instead of measuring up to 20 or so members of the community, humans are able to compare themselves with the top achievers in the world, and social media sites in particular provide just the platform to do so.

**Upward Social Comparison**

Social media provides a platform for social comparison between individuals all around the world. However, most people tend to carefully curate a desirable image, posting only their achievements and successes, not failures (Alfasi, 2019). As a result, social media serves as a way

for individuals to constantly access upward social comparison information, which may lead to depressive symptoms. For example, in one experiment, participants were asked to either browse their Facebook news feed or a Facebook page that lacked social content. Those who had browsed their Facebook news feed reported lower levels of self-esteem and higher levels of depression than those who browsed the non-social feed (Aflasi, 2019). Further analyses revealed that this effect was moderated by a general social comparison tendency (Alfasi, 2019).

Another study found a positive relationship between upward social comparison on social media and depressive symptoms (Liu et al., 2017). The researchers also found that self-esteem mediated this relationship, such that greater upward social comparison was associated with lower levels of self-esteem, which was in turn associated with greater levels of depression (Liu et al., 2017). A different study also established the positive relationship between upward social comparison on social networking sites and depression, but found social anxiety to be the mediator such that more upward social comparison was related to more social anxiety, and this increased social anxiety was related to increased depression (Tong, Qiu, Lian, & Zhang, 2017).

Not all social media browsing is equal, however. The total time spent on social media sites and the frequency with which one checks these sites is an important factor to consider. For example, Twenge, Joiner, Rogers, and Martin (2019) established that adolescents who spent more time on social media were more likely to report having mental health issues. A meta-analysis of 50 articles took this concept a step further, finding that both a greater total time spent on social media and a greater frequency in checking social media was associated with higher levels of depression (Yoon, Kleinman, Mertz, & Brannick, 2019). The researchers also found that greater levels of upward social comparison on social networking sites was associated with higher levels of depression, and this relationship was stronger than the one between time spent on the sites and depression (Yoon et al., 2019). Clearly, there is a link between depression and

social media use, supporting the idea that mass communication and upward social comparison is an important piece of the goal pursuit puzzle.

**Social comparison and disengagement.** There is already some support in the literature for the idea that social comparison information promotes failed disengagement. In one study, researchers Johnson and Stapel (2010) found that threatening social comparisons (i.e., information that others were outperforming the participant) led to participants' greater endorsement of their general goals. Another study broke this concept down into two types of goal motivations: mastery goal approach, when people are motivated to improve their own abilities, and performance goal approach, when people are motivated to outperform others (Kamarova et al., 2017). The researchers found that participants who were experimentally induced to engage in mastery goal approaches reported higher levels of competence and happiness when given upward social comparison information than those who were induced to engage in performance goal approaches. Furthermore, participants who were induced to engage in performance goal approaches and were given downward social comparison information reported the highest levels of happiness of all participants (Kamarova et al., 2017). Thus, people who think of goal pursuit as a way of bettering themselves are protected from the damage of knowing that others are doing a better job as compared to those who pursue goals just to outperform others—but people are the happiest when they pursue goals to outperform others and are told that they are succeeding. People who access social comparison information and conclude that their unobtainable goal is also out of reach for their peers will therefore have an easier time disengaging from the goal (Wrosch, Scheier, Carver, & Shulz, 2003).

## Overview of the Current Study

Existing literature thoroughly demonstrates that emotions can regulate behavior in the context of pursuing goals (Charnov, 1976; Keller & Nesse, 2005; Klinger, 1975). It has also been

theorized that when a person fails to react to affective feedback in an adaptive way, depression can develop as a result of constant low mood over time (Nesse, 1999; Nesse, 2004; Pyszczynski, & Greenberg, 1987). The current models on goal pursuit need to be further developed to create a more comprehensive picture that includes the failure to disengage and distinguishes between low mood and depression (Milyavskaya & Werner, 2018). There are many potential reasons for why some people continue putting effort into fruitless tasks despite persistent low mood, but an overarching concept is that evolutionary time lag leaves humans to navigate a world that they were not built to handle (Buss, 2000). One of the most salient differences between ancestral and modern conditions is the advent of mass communication, which allows for upward social comparison on a global scale (Buss, 2000; Nesse & Williams, 1994). However, the literature discussing this phenomenon has only been theoretical thus far.

This paper seeks to remedy that gap by conducting an experiment examining the effect of social comparison on willingness to disengage in participants tasked with completing impossible anagrams. In the upward social comparison condition, participants are told that that most of their peers are able to complete the majority of the anagrams, whereas in the downward social comparison condition participants are told that most of their peers are only able to complete a few of the anagrams; the control group receives no social information. The first hypothesis of this study was that participants in the upward social comparison condition would spend the most time trying to solve the impossible puzzle, followed by participants in the control condition, with participants in the downward social comparison condition spending the least amount of time.

Furthermore, individual differences have been theorized to play a role in who is able to disengage and who is not. Private self-consciousness, or being aware of one's own abilities and behaviors, can facilitate disengagement by allowing a person to see that their efforts are futile (Wrosch, Scheier, Carver, & Shulz, 2003). Public self-consciousness, on the other hand,

promotes continued engagement in upward social comparison situations through a person's cognizance that others are doing better than they are—as does the need for social desirability, through the related concept of wanting to be seen in a positive light by others (Wrosch, Scheier, Carver, and Shulz (2003). Last, both self-esteem and social anxiety have been shown to mediate the relationship between social comparison and depression in different studies (Liu et al., 2017; Tong et al., 2017). As a result, the second hypothesis of this study was that participants' time spent on the impossible task would be positively correlated with public self-consciousness, social anxiety, and social desirability, and negatively correlated with private self-consciousness and self-esteem.

## Method

### Participants

Participants were 97 students (71 female, 26 male) from Hamilton College recruited via the Psychology Department Sona System. Participants ranged in age from 18-23 years ($M$ = 19.63, $SD$ = 1.22). The majority of participants self-identified as White (61%), with 23% of participants identifying as Asian, 7% mixed-race, 3% Hispanic or Latino, 2% other, and 1% black. For completing Part 1, participants received one point in the Sona system (which goes toward extra credit in psychology courses) or entry into a raffle for one of three $40 gift cards. For completing Part 2, participants received a second Sona point or $5.00 compensation for their time.

### Materials

**Depression**. Participants' general levels of depression were measured via the established Beck Depression Inventory (Beck, Steer, & Brown, 1996). Participants responded to 21 questions on a Likert-type scale ranging from zero to three. The scores for each question were summed, with the highest possible score being 63 and the lowest being zero. Moderate

depression begins with a score of 21, and scores over 40 are considered to be extreme depression. See Appendix A.

**Self-Esteem**. Participants' level of self-esteem was measured via the established Rosenberg Self-Esteem Scale (Rosenberg, 1965). Participants responded to 10 questions (five reverse-worded) on a Likert-type scale ranging from 1 (*Strongly Agree*) to 4 (*Strongly Disagree*) for items such as "I feel that I'm a person of worth, at least on an equal plane with others" and "I take a positive attitude toward myself." The scores for each question were summed, with lower scores indicating greater levels of self-esteem. See Appendix B.

**Social desirability**. How concerned participants are with social approval was measured via the established Marlowe–Crowne Social Desirability Scale (Crowne & Marlowe, 1960). Participants responded to 33 "True" or "False" questions (15 reverse-worded) such as "I am always careful about my manner of dress" and "I am always courteous, even to people who are disagreeable." The number of "True" answers were summed, with higher scores indicating a greater need for social desirability. See Appendix C.

**Social anxiety**. Participants' level of social anxiety was measured via the established Social Anxiety Scale (Fenigstein, Scheier, & Buss, 1975). Participants responded to six questions (one reverse-worded) on a Likert-type scale ranging from 1 (*Extremely uncharacteristic*) to 4 (*Extremely characteristic)* for items such as "It takes me time to overcome my shyness in new situations" and "I get embarrassed very easily." The scores for each question were summed, with higher scores indicating higher levels of social anxiety. See Appendix D.

**Public and private self-consciousness**. How aware participants are of how others view them was measured via the established Public Self-Consciousness Scale (Fenigstein et al., 1975). Participants responded to seven questions on a Likert-type scale ranging from 1 (*Extremely uncharacteristic*) to 4 (*Extremely characteristic*) for items such as "One of the last things I do

before I leave my house is look in the mirror" and "I'm concerned about what other people think of me." The scores for each question were summed, with higher scores indicating higher levels of public self-consciousness. See Appendix E.

Participants' ability to introspectively evaluate themselves and their behavior was measured via the established Private Self-Consciousness Scale (Fenigstein et al., 1975). Participants responded to 10 questions (two reverse-worded) on a Likert-type scale ranging from 1 (*Extremely uncharacteristic)* to 4 (*Extremely characteristic*) for items such as "I'm always trying to figure myself out" and "I'm generally attentive to my inner feelings." The scores for each question were summed, with higher scores indicating higher levels of private self-consciousness. See Appendix F.

**Puzzles**. Participants were tasked with completing an "easy" word-search meant for children ("Easy Spring Word Search"). Participants were also given 15 anagrams to solve, three of which have been established as "easy," three "intermediate," and 9 impossible (Calef et al., 1992). Last, participants could solve an "intermediate" cross-word puzzle ("At a Restaurant"). See Appendix G.

**Motivation**. How motivated a participant felt to continue engaging in the impossible task was measured via a single question: "How important was it for you to complete the anagram puzzles?" answerable on a Likert-type scale ranging from 1 (*Extremely unimportant*) to 6 (*Extremely important*).

**Affect**. Participants' affect was measured via a modified version of the established Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Participants responded to 20 questions assessing the extent to which they currently feel a particular emotion or affective state (e.g., interested, ashamed), on a Likert-type scale ranging from 1 (*Very slightly or not at all)* to 5 (*Extremely*). See Appendix H.

**Procedure**

After signing up for the study but before coming into the lab, participants completed an online survey to measure their general baseline levels of depression, social desirability, social anxiety, private self-consciousness, public self-consciousness, and self-esteem. This was done for the purposes of examining whether the experimental manipulation affected these measures within subjects. Once in the lab and after providing informed consent, participants were told that they would be given a series of three different types of puzzles to work on and that they could choose to move on to the next puzzle by alerting the experimenter at any time, regardless of the completion status of the current puzzle. They were also told, however, that once they moved on from a puzzle, they could not go back to work on it again. The first puzzle was an "easy" word search. The second puzzle was a page of 15 anagrams, with the first three being "easy" and the next two "intermediate" to build momentum. The last 10 words were impossible, with one intermediate word mixed in to avoid suspicion. The amount of time a participant chose to spend on the anagrams section was secretly recorded by the experimenter. Social comparison information was manipulated by text at the top of the anagram sheet. Participants in the upward social comparison group read a statement that most people complete an average of eleven anagrams by the end of the experiment. Participants in the downward social comparison group read a statement that most people complete an average of three anagrams by the end of the experiment. Finally, participants in the no comparison control group read a general fact stating that Greek poets were among the first to use anagrams. The last puzzle, should participants have chosen to move on, was an "intermediate" crossword. At the end of the time period, participants completed an online survey assessing affect, depression, self-esteem, how important completing the puzzles was to the participant, and a section for demographic items (age, sex, race/ethnicity). After the experiment, participants were debriefed and given either Sona credit or $5.00.

## Results

### Preliminary Analyses

I computed the Cronbach's alpha for the Beck Depression Inventory, the Rosenberg Self-Esteem Scale, the Social Anxiety scale, the Public Self-Consciousness scale, the Private Self-Consciousness scale, and the Social Desirability scale and concluded that all of the scales were sufficiently internally reliable (all $\alpha$s > .80), with the exception of the Private Self-Consciousness scale, which had a Cronbach's alpha that indicated low internal reliability ($\alpha$ = .63). Table 1 includes values for means, standard deviations, correlations, and Cronbach's alphas for all of these measures.

Table 1

*Correlations and Descriptive Statistics for Individual Difference Measures*

| | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *M* | *SD* |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Part 1 BDI | .88 | | | | | | | | 29.57 | 7.34 |
| 2. Part 1 Self-Esteem | .68** | .90 | | | | | | | 2.17 | 0.51 |
| 3. Social Anxiety | .08 | .26** | .87 | | | | | | 2.64 | 0.65 |
| 4. Public Self-Consciousness | .35** | .31** | .30** | .80 | | | | | 3.02 | 0.46 |
| 5. Private Self-Consciousness | .18 | .05 | -.06 | .25* | .63 | | | | 2.92 | 0.33 |
| 6. Social Desirability | .23* | .19 | .12 | .23* | .09 | .71 | | | 48.36 | 4.85 |
| 7. Part 2 BDI | .90** | .63** | .05 | .33** | .24* | .25* | .89 | | 28.16 | 7.06 |
| 8. Part 2 Self-Esteem | .68* | .87** | .27** | .38** | .13 | .25* | .67** | .91 | 2.02 | 0.55 |

*Note*. Beck Depression Inventory (0-3 scale, higher scores indicate greater depression); Rosenberg Self-Esteem Scale (1-4 scale, lower scores indicate greater self-esteem); Social Anxiety scale (1-4 scale, higher scores indicate greater social anxiety); Public Self-Consciousness scale (1-4 scale, higher scores indicate greater public self-consciousness); Private Self-Consciousness scale (1-4 scale, higher scores indicate greater private self-consciousness); Social Desirability scale (true/false scale, lower scores indicate greater need for social desirability). Cronbach's alphas are presented along the diagonal.
*$p$ < .05, **$p$ < 0.01.

**Hypothesis 1: The Effect of Social Comparison Information on Time Spent Solving Anagrams**

I predicted that participants in the upward social comparison condition (who were told that previous participants completed an average of 11 anagrams) would spend more time on the anagrams than participants in the control condition (who were told that Greek poets were among the first to use anagrams), and that participants in the control condition would spend more time on the anagrams than participants in the downward social comparison condition (who were told that previous participants completed an average of three anagrams). To test this prediction, I conducted a one-way ANOVA on time spent solving the anagrams as a function of condition. The effect of condition was statistically significant, $F(2, 94) = 5.01$, $p = .009$. Planned comparisons between conditions indicated that participants in the upward social comparison condition ($M = 695.29$, $SD = 469$) spent significantly longer on the anagrams than participants in both the control condition ($M = 496.26$, $SD = 381.02$), $t(94) = -2.24$, $p = .035$, and the downward social comparison condition ($M = 406.84$, $SD = 233.71$), $t(94) = 3.10$, $p = .003$. There was no statistically significant difference in the amount of time spent on the anagrams between the control and the downward social comparison condition, $p = .331$. See Figure 2.

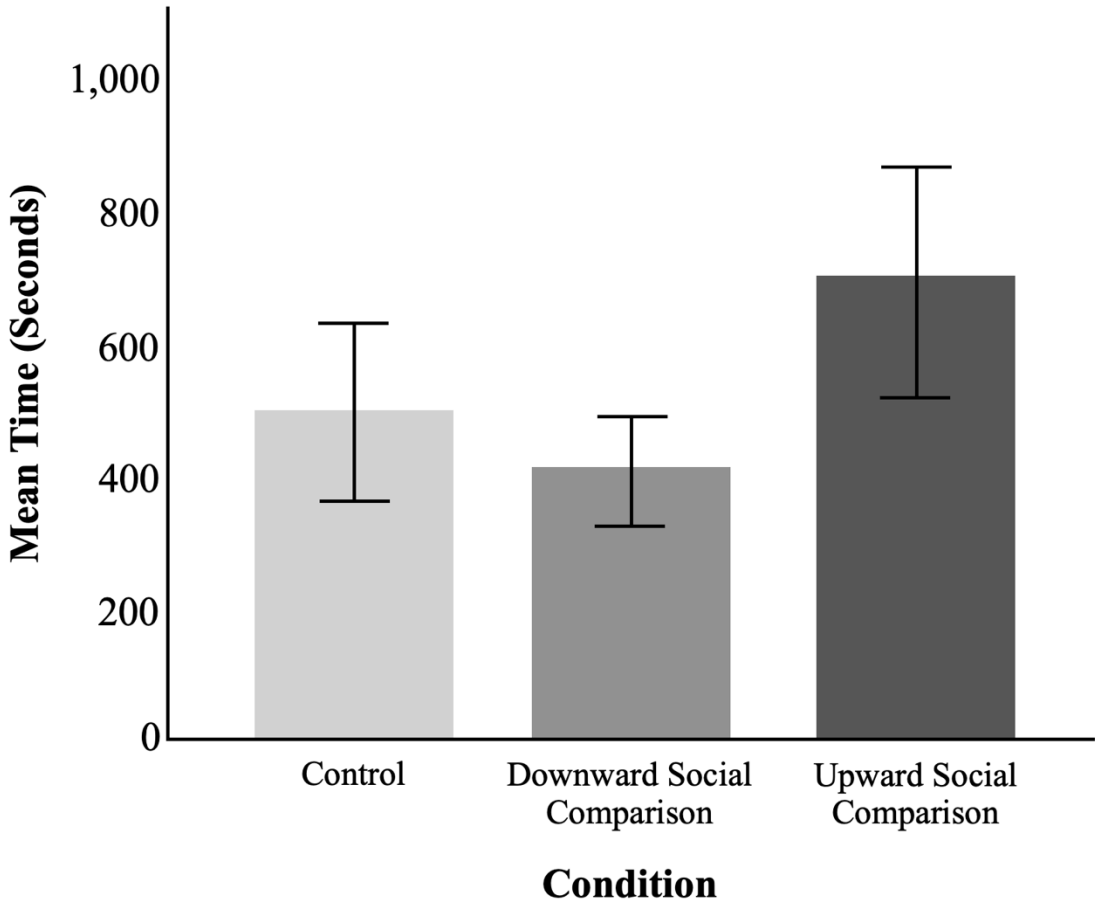


*Figure 2*. Time spent working on the anagrams as a function of social comparison information. Error bars represent ±1 SE.

**Hypothesis 2: Associations Between Individual Difference Measures and Time Spent**

I predicted that participants' time spent on the impossible anagrams task would be positively correlated with public self-consciousness, social anxiety, and social desirability, and negatively correlated with private self-consciousness and self-esteem. To test this prediction, and to explore whether these individual difference variables moderated the effect of condition on time, I ran a series of linear regressions. I first created a dummy variable coding upward comparison as "1" and downward comparison as "0." I then centered all individual difference variables around their means. Next, I regressed time onto condition, the (centered) individual difference measure, and the condition x individual difference measure interaction. In each of

these models, condition was the only significant predictor of time spent on the impossible anagram task. There were no significant main effects of public self-consciousness, social anxiety, social desirability, private self-consciousness, nor self-esteem on time spent, and no significant condition x individual difference measure interactions (all *p*s > .126).

I then examined the association between BDI and time spent on the impossible anagrams task in a regression model containing condition, (centered) BDI, and the condition x BDI interaction. The main effect of condition persisted, $t(60) = 3.26$, $p = .002$. The main effect of BDI was not significant, $t(60) = -1.13$, $p = .264$. However, there was a marginally significant condition x BDI interaction, $t(60) = 1.83$, $p = .073$. Simple slopes analyses revealed that among those low in BDI, condition was unrelated to time spent, $t(60) = 0.67$, $p = .509$. Among people high in BDI, however, those in the upward social comparison condition spent significantly more time on the impossible anagrams task than those in the downward social comparison condition, $t(60) = 3.34$, $p = .001$.

**Exploratory Analyses**

I conducted a one-way ANOVA to test if condition predicted participants' reported level of motivation to complete the anagrams. The test was not statistically significant, $p = .331$. I also conducted a series of one-way ANOVAS to test if condition predicted affect—specifically, feeling distressed, upset, ashamed, determined, or proud. None of these tests were statistically significant (all *p*s > .361). Because there were no direct effects of condition on affect, I did not examine affect as a mediator of the relationship between time and condition.

Finally, I conducted a Pearson correlation to examine the relationship between amount of time spent on the anagrams and participants' reported level of motivation to solve the anagrams. As expected, higher time spent ($M = 529.45$, $SD = 387$) was significantly positively correlated with reported level of motivation ($M = 3.64$, $SD = 1.17$), $r(97) = .30$, $p = .003$. Participants who

spent longer trying to solve the anagrams reported greater levels of motivation to complete the task.

## Discussion

### Major Findings

The results of the current study provide some initial evidence in support of the proposed model. Participants took longer to disengage from an objectively futile task—the impossible anagrams—when presented with social comparison information informing the participant that their peers were doing much better on the same task as compared to participants who had no social information or were told that their peers were performing worse than them. This finding is in line with previous research, wherein participants who received information about others outperforming them endorsed their goals more strongly than participants who did not receive social comparison information (Johnson & Stapel, 2010).

However, the results of the current study also demonstrated that participants who are given no social comparison information spend the same amount of time on a futile task as those who are told that their peers are performing an at inferior level. This contradicts Wrosch et al.'s (2003) conclusion that individuals have an easier time disengaging from an unobtainable goal when they see that their peers are also unable to be successful. Furthermore, the complete lack of relationship between time spent and the individual difference measures explored in this study was surprising in light of previous literature. Because private self-consciousness is the level of awareness of one's own abilities, Wrosch et al. (2003) theorized that adequate levels of this variable should facilitate disengagement by allowing a person to see that their efforts are futile. Social desirability, or someone's need to be perceived favorably by others, should lead to continued engagement by making success that much more important, as should high levels of public self-consciousness, through a person's recognition that they are being outperformed by

others and need to catch up (Wrosch et al., 2003). One possible explanation to account for why the results did not coincide with this literature is that these ideas are just that—ideas. The literature on these particular topics is purely theoretical, and thus the theories may need to be adjusted in light of new empirical evidence.

Still, the question remains as to why the self-esteem and social anxiety variables were also unrelated to time spent on the anagrams. One study demonstrated that people who are exposed to greater levels of upward social comparison content on social networking sites tend to have higher levels of depression (Yoon et al., 2019). Self-esteem and social anxiety have both been shown to mediate the relationship between upward social comparison on social media and depressive symptoms (Liu et al., 2017; Tong, Qiu, Lian, & Zhang, 2017). However, these studies were purely correlational. Furthermore, all of these studies examined social comparison information on social media sites, whereas the current study examined puzzle performance. Perhaps the type and source of social comparison matters.

**Implications**

This study demonstrates that engagement in an impossible goal can indeed be manipulated with social comparison information, and, according to the results of this study, may *not* be due to individual differences in depression, self-esteem, social anxiety, public or private self-consciousness, or even affect. Still, the current paper puts forth a comprehensive framework built upon decades of previous research that had yet to converge towards a single model. Furthermore, evolutionary psychology can clearly add a rich and unique perspective to the discussion of depression, yet it has been nearly completely ignored in the field of psychiatry (Nesse, 2004). The current study provides support for a potential tool to be used by mental health professionals. For example, a therapist could help a client who is struggling with the ability to achieve a major life goal by emphasizing circumstances in which many other people fail to

achieve the goal in question, before guiding the client towards pursuing a different goal. Perhaps these results can even extend to promoting continued engagement in an achievable task, such as providing an individual suffering from substance use disorder upward social comparison statistics about success rates with a particular treatment. For example, a person with an addiction who hears that most people in their rehabilitation program achieve at least a year of sobriety may be motivated to reach for that same achievement.

**Limitations**

Despite its contributions, the current study suffered from a number of limitations that limit the inferences we can draw from the results.

**Participant abilities.** Not all participants could participate in the puzzles equally. Although six anagrams were possible to solve, many participants did not get all six. Several participants either remarked that they were good at puzzles because they did them all the time, or that they were terrible at puzzles. Taking pride in being a person who is skilled at solving puzzles could further motivate an individual to solve the anagrams, beyond the social comparison manipulation. Additionally, when such an individual in the upward social comparison condition inevitably fails at the anagrams task, this could lead to a decrease in self-esteem or increase in feelings of shame that is hard to parse apart from any experimental effects. Furthermore, participants differed in their English proficiency. Some participants were international students who spoke English as a second language, and at least a few such individuals remarked that they were bad at the puzzles, particularly the anagrams and crossword puzzle, because they did not have an expansive English vocabulary. These participants may not be manipulated by social comparison information in the same way. For example, an international student hearing that previous participants completed an average of 11 anagrams (five more anagrams than anyone could actually solve) may not feel as much pressure to achieve the same score because they have

the excuse of being less familiar with the language than their peers. Conversely, these participants could feel *more* pressure to achieve the same score in an attempt to make up for a possible insecurity in English proficiency. It is unclear if these differences are potential limitations or if these differences resolved via random assignment.

**Puzzle sequence.** In order to mask the importance of the anagrams to the experimental hypothesis, an easy word search and intermediate crossword puzzle were included. The word search was meant to serve as a sort of "warm up" puzzle, and the crossword puzzle existed for there to be something for participants to move on to, since time was measured from the moment participants began working on the puzzle to the moment they requested to move on to the next puzzle. If participants were then told that no other puzzle existed, this may have revealed the importance of the anagram puzzle and influenced subsequent responses to the computer survey. The original sequence was chosen so that the anagram was masked between two puzzles, yet did not come after such a long series of puzzles so as to induce participant fatigue.

The potential limitation, however, is that the vast majority of participants were able to complete the crossword puzzle fully or almost fully, and thus they could have gained a self-esteem or affect boost that could have masked any deficits in such measures that the anagrams produced. This is of particular importance because none of the individual difference measures predicted time spent, nor moderated the effect of condition on time spent. Perhaps results would have revealed a relationship between self-esteem/affect and time spent if it were not for the crossword puzzle.

**Attrition.** Many participants took the first part of the study, which was online, but did not come in to the lab to participate in the second part of the study. In fact, there was a 50% attrition rate. There are several potential reasons for this. First, participants may not have been interested in receiving compensation beyond one Sona point or entry in a raffle. For example, a psychology

student may have only needed one more point to achieve their extra credit goal. Additionally, the idea of carving an hour out of one's schedule for the lab portion may not have been feasible for some students.

On a related note, participants were aware that they could leave when they were done with the puzzles, and thus the upward social comparison manipulation may compete with a student's drive to finish as quickly as possible to be done with the study and move on to their next obligation. Indeed, the average time spent on anagrams across conditions was approximately nine minutes, despite the fact that participants were scheduled to participate for one hour.

The observed attrition is a limitation if there is something systematically different about the participants who came in for the lab portion, such as having more free time, or—and perhaps more relevant to the current study—more motivation. Whether it be motivation to achieve as much extra credit as possible, motivation to help a senior thesis student with their project, or motivation to see their participation through to the end, differing levels of baseline motivation are important to consider in a study where motivation itself was a measured variable.

Perhaps one of the most important potential attrition factors to consider, however, is difference in participant depression levels. The experimental sample could not have included participants with levels of depression so high that the idea of physically coming in to the lab for an hour seems impossible. The type of depressive disorder that leads to early disengagement may manifest in the same individual who will not complete or even attempt to complete the goal of finishing a psychology study. It is unclear where the BDI scale falls on this spectrum. Because the mean BDI for participants in the sample was 29.57, which is labeled as "moderate clinical depression," moderate depression as defined by these parameters must not be great enough to cause the described attrition. Furthermore, participants who had BDI levels one standard

deviation above the mean were actually *more* likely to spend time on the puzzle when given social comparison information.

**Hypothesis guessing.** Because the experimental manipulation was social comparison information, I needed to make sure that participants actually took in such information. Leaving it amongst the general puzzle instructions printed at the top of each page could have easily caused it to be ignored by participants. Therefore, the social comparison information (or general fact) was printed in a bold, red, larger font, and experimenters read each note aloud to participants before handing over the puzzle.

The downside of this approach, however, is that participants knew the notes were clearly important, and this led many to ponder how the notes were related to the experimental hypothesis (especially among psychology students who are eager to figure out the "trick"). At the end of the experiment, each participant was asked if they had any suspicions regarding the study, and 18% were able to guess that either the anagrams were not solvable or that the social comparison information was false. These data were *not* excluded from the statistical analyses, however. The fact that the main prediction was supported by the data lends credence to the idea that even participants who know the manipulation can be manipulated by it. In fact, the results might even be conservative, in that participants who know that their peers did not actually complete more anagrams than them should feel able to disengage earlier.

**Future Directions**

**Individual difference measures.** This study examined participants' individual differences in depression, self-esteem, personal self-consciousness, public self-consciousness, social desirability, and social anxiety, yet none of these measures predicted time spent on the anagrams nor moderated the relation between time and condition (with the exception BDI). Thus, these results leave much to be desired in terms of understanding how and why social

comparison information leads people to spend more time on fruitless tasks. One potential avenue to explore is the variable of competitiveness. Perhaps there was no significant difference between the control and downward social comparison groups because Hamilton College students are competitive enough to still desire solving as many anagrams as possible, even when they see that their peers completed fewer anagrams than them.

**Other independent variables.** The current study focused on social comparison as a potential contributing factor leading to continued engagement despite negative affect. However, as described in the introduction, the literature supports several other factors as potential contributors, such as the type of motivation behind the goal, rumination, and the length of time it takes to complete a goal. Evolutionary time lag can also lead to modern differences such as decreased support network and a lack of close, testable friendships. Future research should seek to expand on the model proposed here by investigating how these variables fit in the overall picture.

**Experimental procedure.** In this study, the information provided to participants about the total number of puzzles to be completed was ambiguous, and specific instructions about this were not administered systematically. Depending on the experimenter, some participants may have seen the puzzles laid out on the table and made inferences about it being a finite list of three. Some participants made the point to ask how many puzzles there were, and a few participants even mentioned that they would have spent longer working on the anagrams if they knew that there were only three puzzles. Future research exploring this model should investigate whether or not the knowledge of there being three puzzles influences the results or not. Such knowledge is of importance to the goal pursuit model in general, since it directly involves participants' assessment of how to portion resources across several tasks.

## Conclusion

Depression has been on the rise in recent decades (Duffy, Twenge, & Joiner, 2019; Klerman, 1985). It is a debilitating disease that leaves much to be desired in terms of effective treatment options and even robust etiology. A suffering society can leave no stone unturned until a loved one is never again lost to suicide. Yet, existing literature proposes that depression can arise as a result of the inherent challenge in humans navigating a world for which they did not evolve (Buss, 2000). The established incentive-disengagement cycle, in which emotions regulate behavior in adaptive ways (Klinger 1975), can be drawn upon to explain a circumstance of modern depression that arises over time due to the failure of an individual to react in accordance with their emotions (Nesse, 1999; Nesse, 2004; Pyszczynski, & Greenberg, 1987). The current paper brings together various theories of goal pursuit into an inclusive and thorough model. This model incorporates both adaptive and maladaptive pathways and distinguishes between low mood and depression. The results of this study reveal initial evidence to support the prediction that social comparison is at least one motivator for continued engagement. However, the explanation for these findings is still unclear. What is it about social comparison that motivates participants to spend longer on the anagrams? Why do participants care when they find out that their peers are doing better? Future studies can seek to answer these questions, and others, to build upon this model.

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## Appendix A
## Beck Depression Inventory

For each question, please select the statement that most describes you.

1.

0 I do not feel sad.

1 I feel sad.

2 I am sad all the time and I can't snap out of it.

3 I am so sad and unhappy that I can't stand it.

2.

0 I am not particularly discouraged about the future.

1 I feel discouraged about the future.

2 I feel I have nothing to look forward to.

3 I feel the future is hopeless and that things cannot improve.

3.

0 I do not feel like a failure.

1 I feel I have failed more than the average person.

2 As I look back on my life, all I can see is a lot of failures.

3 I feel I am a complete failure as a person.

4.

0 I get as much satisfaction out of things as I used to.

1 I don't enjoy things the way I used to.

2 I don't get real satisfaction out of anything anymore.

3 I am dissatisfied or bored with everything.

5.

0 I don't feel particularly guilty.

1 I feel guilty a good part of the time.

2 I feel quite guilty most of the time.

3 I feel guilty all of the time.

6.

0 I don't feel I am being punished.

1 I feel I may be punished.

2 I expect to be punished.

3 I feel I am being punished.

7.

0 I don't feel disappointed in myself.

1 I am disappointed in myself.

2 I am disgusted with myself.

3 I hate myself.

8.

0 I don't feel I am any worse than anybody else.

1 I am critical of myself for my weaknesses or mistakes.

2 I blame myself all the time for my faults.

3 I blame myself for everything bad that happens.

9.

0 I don't have any thoughts of killing myself.

1 I have thoughts of killing myself, but I would not carry them out.

2 I would like to kill myself.

3 I would kill myself if I had the chance.

10.

0 I don't cry any more than usual.

1 I cry more now than I used to.

2 I cry all the time now.

3 I used to be able to cry, but now I can't cry even though I want to.

11.

0 I am no more irritated by things than I ever was.

1 I am slightly more irritated now than usual.

2 I am quite annoyed or irritated a good deal of the time.

3 I feel irritated all the time.

12.

0 I have not lost interest in other people.

1 I am less interested in other people than I used to be.

2 I have lost most of my interest in other people.

3 I have lost all of my interest in other people.

13.

0 I make decisions about as well as I ever could.

1 I put off making decisions more than I used to.

2 I have greater difficulty in making decisions more than I used to.

3 I can't make decisions at all anymore.

14.

0 I don't feel that I look any worse than I used to.

1 I am worried that I am looking old or unattractive.

2 I feel there are permanent changes in my appearance that make me look unattractive.

3 I believe that I look ugly.

15.

0 I can work about as well as before.

1 It takes an extra effort to get started at doing something.

2 I have to push myself very hard to do anything.

3 I can't do any work at all.

16.

0 I can sleep as well as usual.

1 I don't sleep as well as I used to.

2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.

3 I wake up several hours earlier than I used to and cannot get back to sleep.

17.

0 I don't get more tired than usual.

1 I get tired more easily than I used to.

2 I get tired from doing almost anything.

3 I am too tired to do anything.

18.

0 My appetite is no worse than usual.

1 My appetite is not as good as it used to be.

2 My appetite is much worse now.

3 I have no appetite at all anymore.

19.

0 I haven't lost much weight, if any, lately.

1 I have lost more than five pounds.

2 I have lost more than ten pounds.

3 I have lost more than fifteen pounds.

20.

0 I am no more worried about my health than usual.

1 I am worried about physical problems like aches, pains, upset stomach, or constipation.

2 I am very worried about physical problems and it's hard to think of much else.

3 I am so worried about my physical problems that I cannot think of anything else.

21.

0 I have not noticed any recent change in my interest in sex.

1 I am less interested in sex than I used to be.

2 I have almost no interest in sex.

3 I have lost interest in sex completely.

## Appendix B
## Rosenberg Self-Esteem Scale

Please indicate how strongly you agree or disagree with each of the following statements.

1. On the whole, I am satisfied with myself.
Strongly Agree Agree Disagree Strongly Disagree

2. At times I think I am no good at all. [R]
Strongly Agree Agree Disagree Strongly Disagree

3. I feel that I have a number of good qualities.
Strongly Agree Agree Disagree Strongly Disagree

4. I am able to do things as well as most other people.
Strongly Agree Agree Disagree Strongly Disagree

5. I feel I do not have much to be proud of. [R]
Strongly Agree Agree Disagree Strongly Disagree

6. I certainly feel useless at times.*
Strongly Agree Agree Disagree Strongly Disagree

7. I feel that I'm a person of worth, at least on an equal plane with others.
Strongly Agree Agree Disagree Strongly Disagree

8. I wish I could have more respect for myself. [R]
Strongly Agree Agree Disagree Strongly Disagree

9. All in all, I am inclined to feel that I am a failure. [R]
Strongly Agree Agree Disagree Strongly Disagree

10. I take a positive attitude toward myself.
Strongly Agree Agree Disagree Strongly Disagree

## Appendix C
## Marlowe–Crowne Social Desirability Scale

Please read each item and decide whether it is true (T) or false (F) for you.

| | | | |
|---|---|---|---|
| 1. | T | F | Before voting I thoroughly investigate the qualifications of all the candidates. |
| 2. | T | F | I never hesitate to go out of my way to help someone in trouble. |
| 3. | T | F | It is sometimes hard for me to go on with my work if I am not encouraged. [R] |
| 4. | T | F | I have never intensely disliked anyone. |
| 5. | T | F | On occasions I have had doubts about my ability to succeed in life. [R] |
| 6. | T | F | I sometimes feel resentful when I don't get my way. [R] |
| 7. | T | F | I am always careful about my manner of dress. |
| 8. | T | F | My table manners at home are as good as when I eat out in a restaurant. |
| 9. | T | F | If I could get into a movie without paying and be sure I was not seen, I would probably do it. [R] |
| 10. | T | F | On a few occasions, I have given up something because I thought too little of my ability. [R] |
| 11. | T | F | I like to gossip at times. [R] |
| 12. | T | F | There have been times when I felt like rebelling against people in authority even though I knew they were right. [R] |
| 13. | T | F | No matter who I'm talking to, I'm always a good listener. |
| 14. | T | F | I can remember "playing sick" to get out of something. [R] |
| 15. | T | F | There have been occasions when I have taken advantage of someone. [R] |
| 16. | T | F | I'm always willing to admit it when I make a mistake. |
| 17. | T | F | I always try to practice what I preach. |
| 18. | T | F | I don't find it particularly difficult to get along with loudmouthed, obnoxious people. |
| 19. | T | F | I sometimes try to get even rather than forgive and forget. [R] |

| | | | |
|---|---|---|---|
| 20. | T | F | When I don't know something I don't mind at all admitting it. |
| 21. | T | F | I am always courteous, even to people who are disagreeable. |
| 22. | T | F | At times I have really insisted on having things my own way. [R] |
| 23. | T | F | There have been occasions when I felt like smashing things. [R] |
| 24. | T | F | I would never think of letting someone else be punished for my wrongdoings. |
| 25. | T | F | I never resent being asked to return a favor. |
| 26. | T | F | I have never been irked when people expressed ideas very different from my own. |
| 27. | T | F | I never make a long trip without checking the safety of my car. |
| 28. | T | F | There have been times when I was quite jealous of the good fortune of others. [R] |
| 29. | T | F | I have almost never felt the urge to tell someone off. |
| 30. | T | F | I am sometimes irritated by people who ask favors of me. [R] |
| 31. | T | F | I have never felt that I was punished without cause. |
| 32. | T | F | I sometimes think when people have a misfortune they only got what they deserved. [R] |
| 33. | T | F | I have never deliberately said something that hurt someone's feelings. |

## Appendix D
## Social Anxiety Scale

Please indicate how characteristic each of the following statements are for you.

1. It takes me time to overcome my shyness in new situations.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

2. I have trouble working when someone is watching me.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

3. I get embarrassed very easily.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

4. I don't find it hard to talk to strangers. [R]
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

5. I feel anxious when I speak in front of a group.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

6. Large groups make me nervous.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

## Appendix E
## Public Self-Consciousness Scales

Please indicate how characteristic each of the following statements are for you.

1. I'm concerned about my style of doing things.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

2. I'm concerned about the way I present myself.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

3. I'm self-conscious about the way I look.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

4. I usually worry about making a good impression.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

5. One of the last things I do before I leave my house is look in the mirror.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

6. I'm concerned about what other people think of me.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

7. I'm usually aware of my appearance.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

## Appendix F
## Private Self-Consciousness Scales

Please indicate how characteristic each of the following statements are for you.

1. I'm always trying to figure myself out.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

2. Generally, I'm not very aware of myself.[R]
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

3. I reflect about myself a lot.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

4. I'm often the subject of my own fantasies.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

5. I never scrutinize myself. [R]
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

6. I'm generally attentive to my inner feelings.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

7. I'm constantly examining my motives.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

8. I sometimes have the feeling that I'm off somewhere watching myself.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

9. I'm alert to changes in my mood.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

10. I'm aware of the way my mind works when I work through a problem.
Extremely uncharacteristic Uncharacteristic Characteristic Extremely characteristic

Appendix G
Puzzles

Please spend at much time as you want on the following puzzle before moving on to the next puzzle. Once you choose to move on, however, you cannot come back to the previous puzzle. When you would like to move on, please alert the experimenter.
Complete the following word search.

**Note: Word searches were invented in 1968.**


| | |
|---|---|
| BIRD | LAMB |
| BUD | NET |
| EGG | RAIN |
| FLOWER | SPRING |

Please spend at much time as you want on the following puzzle before moving on to the next puzzle. Once you choose to move on, however, you cannot come back to the previous puzzle. When you would like to move on, please alert the experimenter.
Unscramble the following words.

**Note: Greek poets are thought to be among the first to use anagrams.**

**1. MGAE** _____

**2. PLEPA** _____

**3. WLAHE** _____

**4. HTBUM** _____

**5. HGAREC** _____

**6. WTALE** _____

**7. EILCANDR** _____

**8. ORNTAAL** _____

**9. AGOARN** _____

**10. FSHEIS** _____

**11. WISHDO** _____

**12. MATNRAI** _____

**13. OPOER** _____

**14. RCADTO** _____

**15. ATHWIG** _____

Please spend at much time as you want on the following puzzle before moving on to the next puzzle. Once you choose to move on, however, you cannot come back to the previous puzzle. When you would like to move on, please alert the experimenter.
Unscramble the following words.

**Note: Previous participants completed an average of 11 anagrams.**

**1. MGAE** _____

**2. PLEPA** _____

**3. WLAHE** _____

**4. HTBUM** _____

**5. HGAREC** _____

**6. WTALE** _____

**7. EILCANDR** _____

**8. ORNTAAL** _____

**9. AGOARN** _____

**10. FSHEIS** _____

**11. WISHDO** _____

**12. MATNRAI** _____

**13. OPOER** _____

**14. RCADTO** _____

**15. ATHWIG** _____

Please spend at much time as you want on the following puzzle before moving on to the next puzzle. Once you choose to move on, however, you cannot come back to the previous puzzle. When you would like to move on, please alert the experimenter.
Unscramble the following words.

**Note: Previous participants completed an average of 3 anagrams.**

**1. MGAE** _____

**2. PLEPA** _____

**3. WLAHE** _____

**4. HTBUM** _____

**5. HGAREC** _____

**6. WTALE** _____

**7. EILCANDR** _____

**8. ORNTAAL** _____

**9. AGOARN** _____

**10. FSHEIS** _____

**11. WISHDO** _____

**12. MATNRAI** _____

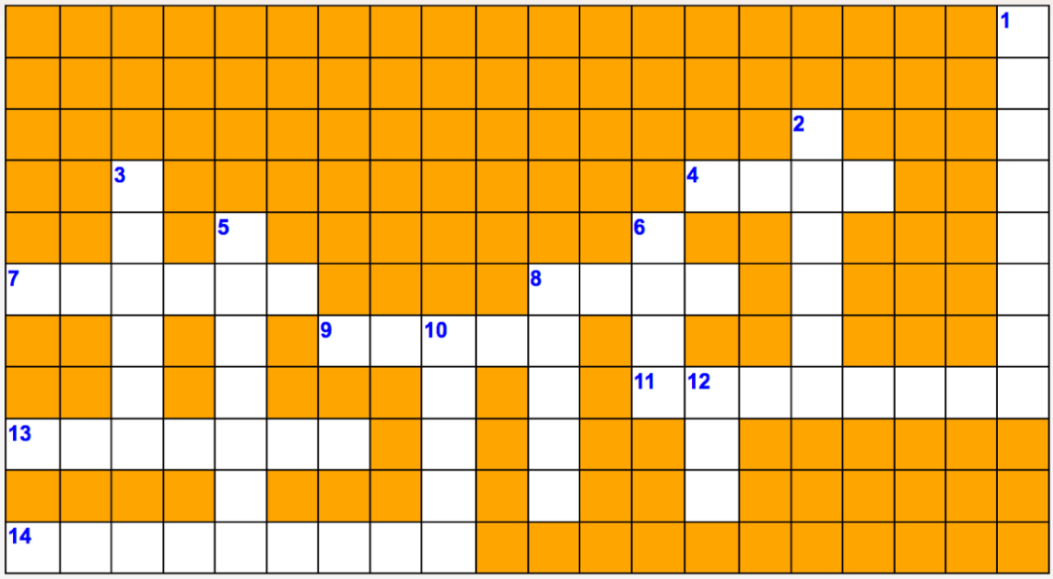
**13. OPOER** _____

**14. RCADTO** _____

**15. ATHWIG** _____

Please spend at much time as you want on the following puzzle before moving on to the next puzzle. Once you choose to move on, however, you cannot come back to the previous puzzle. When you would like to move on, please alert the experimenter.
Complete the following crossword puzzle.

**Note: Crossword puzzles are the most common puzzle completed in the United States.**



Check

**Across:**

**4.** The first _____ of the day is breakfast. The second is lunch. The third is dinner.
**7.** He takes your order and brings you your food.
**8.** This person stays in the kitchen and cooks your food.
**9.** A table at the side of the restaurant, where some of the seats are cushioned.
**11.** Knife, fork, spoon.
**13.** She greets you when you enter and takes you to your table.
**14.** Food before the main course.

**Down:**

**1.** She takes your order and brings you your food.
**2.** It's polite to put this in your lap while you eat in order to catch any spills.
**3.** Wine. Beer. Soda. Juice.
**5.** Food after the main course, usually sweet.
**6.** The list of all the food served at the restaurant.
**8.** When you're ready to pay, say "_____, please!"
**10.** "May I take your _____?" "Yes, please. I'll have the chicken."
**12.** It's polite to give a _____ to your waiter or waitress for good service.

## Appendix H
## Positive and Negative Affect Schedule

Please read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, that is, at the present moment.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| very slightly or not at all | a little | moderately | quite a bit | extremely |

| | |
|---|---|
| _____ interested | _____ irritable |
| _____ distressed | _____ alert |
| _____ upset | _____ ashamed |
| _____ strong | _____ inspired |
| _____ guilty | _____ nervous |
| _____ scared | _____ determined |
| _____ hostile | _____ attentive |
| _____ enthusiastic | _____ jittery |
| _____ proud | _____ active |
| _____ afraid | |