
Honors Projects and Presentations: Undergraduate

2021

Innate Longing for Connection: A Biopsychological View of Spiritual Longing Mediated by Oxytocin

Megan Hamilton

Follow this and additional works at: <https://mosaic.messiah.edu/honors>



Part of the [Psychology Commons](#)

Permanent URL: <https://mosaic.messiah.edu/honors/407>

Recommended Citation

Hamilton, Megan, "Innate Longing for Connection: A Biopsychological View of Spiritual Longing Mediated by Oxytocin" (2021). *Honors Projects and Presentations: Undergraduate*. 407.

<https://mosaic.messiah.edu/honors/407>

Sharpening Intellect | Deepening Christian Faith | Inspiring Action

Messiah University is a Christian university of the liberal and applied arts and sciences. Our mission is to educate men and women toward maturity of intellect, character and Christian faith in preparation for lives of service, leadership and reconciliation in church and society. This content is freely provided to promote scholarship for personal study and not-for-profit educational use.

**Innate Longing for Connection:
A Biopsychological View of Spiritual Longing Mediated by Oxytocin**

Megan Hamilton

Honors Program, Messiah University

Abstract

Humans have an innate longing for connection with someone or something. Upon analysis of current literature, it was found that this longing correlates with biological and psychological pathways that influence human behavior. Among many factors, the hormone, oxytocin (OT), contributes to these systems and even mediates or buffers them. The effects of OT are evidenced by bonds formed with caregivers, romantic partners, God, and at times harmful substances. The onset and severity of mental illnesses are also partially impacted by this human need for social support and connection. After reviewing and analyzing literature from many domains, this internal hardwiring suggests a significance or purpose in the human makeup, more succinctly: Divine Creation. Biopsychological mechanisms—mediated in part by OT—and the resulting behaviors or psychological disorders demonstrate the human need for connection and potentially union or relationship with an ultimate, satisfying source, which is found in God. This paper seeks to illuminate pathways that contribute to our longing for connection, which ultimately reflect the purpose of human creation: to be in relationship with others and God.

Innate Longing for Connection:

A Biopsychological View of Spiritual Longing Mediated by Oxytocin

Human relationships, patterns of bonding, and the spiritual essence of human existence signify a universal desire: connection. Brené Brown (2010) further describes this need for belonging as “the innate human desire to be a part of something larger than us” (p. 26). This yearning is intrinsically wired in all of us and presents itself in many ways: bonding with spiritual powers or beings, engaging in social connections with friends or families, and even creating bonds with addictive substances (e.g., drugs, alcohol). Though we may not always identify these veiled desires or possess the capability to name them, the biological and psychological processes of the human body push us towards connection with others. A lack thereof or substitutions for meaningful relationships can be consequential. Each one of us experiences an innate longing to be attached to *something*—be it person, object, or higher power. Our biological and psychological systems, mediated by the effects of the hormone, oxytocin (OT), reflect a Divine Creation in which we are created to connect with others and ultimately with God, fulfilling even our deepest longings.

The Role of OT

Biological Background

Our bodies are hardwired with certain pathways, and our internal, biological systems often affect our behaviors and responses to situations. Consequently, when reviewing literature on connection and the resulting biopsychological implications, a trend emerged from the current data that suggested hormonal involvement. Tied to our innate desire for connection and also to the consequences of loneliness is the hormone, oxytocin (OT). Derived from the hypothalamus, OT is released by the posterior pituitary for a range of biological and psychological reasons

(Watson & Breddlove, 2019). OT plays a continuous role throughout our life span: stimulating childbirth (Watson & Breddlove, 2019), creating bonds in different stages of life, and promoting healthy social behaviors (Cacioppo & Patrick, 2008). Cacioppo and Patrick (2008) even describe OT as the “master chemical” of “social connection” (p. 137). From a closer biological view of this hormonal system, cells that produce OT do not work alone but, in a cluster—in connection with one another—to respond to neurological impulses that then trigger the release of OT (Cacioppo & Patrick, 2008). It is quite interesting that OT-producing cells operate in the same way as a *grouping* of cells in order to produce the same prosocial behaviors in humans. This specific biological occurrence reflects the argument of Divine Creation. Our bodies and its cells must be connected, working together for our benefit. Often, these processes, as exemplified in the role of OT, continue to drive us towards connection with others through relationships. Furthermore, this biological hardwiring, written in our genetic code, suggests the importance of connection, our longing for it, and even how we can achieve it—with the potential of forming an attachment to a higher power, the Designer of our biological makeup.

Psychological Background

Even though biology functions with hormones and neural responses to promote attachment, human psychology also influences the process of social connection. Though biological in its nature, OT shapes the psychological presentation of longing for connection in the human experience. From birth, humans demonstrate the need for these bonds in order to survive (Lieberman, 2013). At the earliest moments of life, babies require parental or caregiver bonding in order to meet their basic physiological and security needs (Lieberman, 2013). Building off of this, humans flourish with love and belonging since these too are necessary for survival. Upon further analysis of social needs, OT reveals itself as a driving force in both

biological and psychological responses. Amongst its many functions, OT importantly acts as a social hormone to “increase empathy and trust behavior” (Fishbane, 2013, p. 65) by reducing anxiety and promoting sociability and attachment in relationships, all of which benefit us.

Prosocial Behavior

In order to fulfill this human need for connection, OT operates to promote prosocial behavior. Lieberman (2013) suggests that OT may influence the dopaminergic neural pathways to enhance approach behavior and to spark socialization. In their monetary exchange experimental design, Zak et al., (2005) discovered that OT levels increased when participants felt social trust between one another. Not only does OT facilitate approach behaviors that inspire connection, but perceived levels of trustworthiness enhance the release of the hormone to further solidify the socialization. Hoge et al. (2008) also conjecture that OT may act as a buffer between social anxiety and social behavior. In their experiment, increased levels of OT were correlated with a rise in social interaction amongst participants with social anxiety disorder (Hoge et al., 2018). This increase in OT implies that the hormone functions to reduce anxiety by serving as a biological encouragement to connect with others. Humans benefit significantly from interactions with each other, and our internal systems will continue to push us to seek out these relationships.

Stress Response

As we lean into connections, our systems reward us for doing so. OT promotes approach behavior for social rewards and cognitive benefits, and Lieberman (2013) proposes that these responses are also part of OT’s role as a stress reducer. The stress hormone, cortisol, has been correlated to increases in negative and social consequences as a result of separation from other people (Lieberman, 2013). Yet, OT is released to decrease these stress levels by promoting social behavior, especially when another person experiences distress. OT may also work to reduce

activity in the amygdala, the emotion/fear portion of the brain, suggesting that OT aims to reduce anxiety by promoting healthy social behaviors (Lieberman, 2013). Other researchers have noted this stress-buffering effect of OT. During an experiment with a stress test and intranasal OT administration, it was found that higher levels of OT and social support correlated to lower levels of cortisol during the stress test (Heinrichs et al., 2003). Researchers thus suggest that OT works as a protective mechanism against stress. (Heinrichs et al., 2003). This is perhaps more readily understood from everyday life as seen in common female behavior. Under stress, OT levels rise in women, driving them to seek out other people or their relationships in order to protect against the consequences of prolonged distress (Goleman, 2006). In addition to reducing stress, other health benefits associated with OT include reduction in blood pressure and pain and also enhancing the healing process (Fishbane, 2013). OT operates in many pathways to establish bonds with others by reducing stress to promote behaviors that enhance our overall wellbeing.

Although social experiences are not always positive in nature, OT will work to minimize any negative effects that follow adverse circumstances. Pain experienced from these situations may signal us to address issues in our relationships, and OT will buffer the rewards or try to reduce the stress of these conflicts (Lieberman, 2013). Interestingly, Pfundmair et al. (2014) sought to determine the effects of ostracism, a negative social experience, on participants with a collectivist mindset, who draw more readily from their social connectedness with one another. After an ostracizing experience, researchers discovered that OT mediated the negative effects on social comfort, potentially by preventing withdrawal behaviors as a response to the negative social situation (Pfundmair et al., 2014). However, the researchers noted that OT is not a stand-alone protective factor, but the collectivist mindset of participants also played a role in the effects following the ostracizing event (Pfundmair et al., 2014). Perhaps, if we alter our own

perspectives towards social connectedness, realizing its significance in our own lives, we may create an internal, psychological environment that is more open to the positive effects of OT that promote social comfort. Then, we may find an even deeper desire for more significant connections with each other and potentially the One who designed us as social creatures.

Separation and Loneliness

Though we may try to change our responses to positive and negative social situations, we cannot always prevent the consequences of not belonging or losing a social connection. Beginning with an evolutionary perspective, it has been theorized that social connections functioned as a means of survival (Goleman, 2006). As a result, separation from others threatened an individual's chance of survival. Although this is not as obvious in the modern age, our bodies are still hardwired to alert us to separation and to the negative consequences that may follow (Goleman, 2006). Interestingly, these negative impacts still play a role in quality of life and in some more serious situations, an individual's survival.

Whether we have experienced it or not, lack of connection with others, or loneliness, interferes with our innate drive for social bonds. Separation acts and is experienced as a form of pain. Lieberman (2013) likens it to a "drug withdrawal-like pain, whereas reconnection appears to act like a painkiller" (p. 50). Additionally, loneliness complicates the positive hormonal functions of OT. For instance, subjective experiences of separation may dampen the immune and cardiovascular system (Cacioppo & Patrick, 2008). Loneliness has also been correlated with increased stress hormones, which can contribute to a decline in overall health and wellbeing (Cacioppo & Patrick, 2008). Disconnection may also impact presentations of depression and anxiety (Lieberman, 2013; Goleman, 2006). These harsh, physiological and psychological consequences of separation speak to the importance of social bonds in the human experience.

Additionally, our unmet longings for connections can evolve into harmful coping mechanisms when social bonds are not satisfied. Individuals may give into objects or fall into harmful behaviors to immediately self-soothe or self-satisfy the unnamable or unrecognized desire to simply be with another human being (Cacioppo & Patrick, 2008). This is evident in lonely adults who are more at risk of overindulging in food, smoking, drinking, or acting out sexually in order to cope with their increasing loneliness (Cacioppo & Patrick, 2008).

Additionally, in situations lacking connection and physical touch, OT is unable to produce effective and beneficial calmness (Cacioppo & Patrick, 2008). Without this close proximity and healthy touch in our lives, we fall into an unhealthy spiral of disconnection and deep pain of our unmet longings for relationships. We depend on social bonds for our wellbeing, and “the longing for people we miss expresses in part a yearning for this biologically helpful connection” (Goleman, 2006, p. 245). This psychological pain, which is reflected in our biological responses, ultimately speaks to the purpose of our human design: to connect.

Attachment and OT

Attachment Styles

Innate longing for connection reveals itself in many ways in the human experience, but particularly in the chronology of our lives. Moreover, OT operates throughout the life span by way of the significant bonds that we form. In the domain of psychology, these bonds are often referred to as attachment styles that present during development and may contribute to relationship formation in adulthood (Goleman, 2006). This process begins with attachment to parents during the crucial stages of a child’s development (Goleman, 2006). Parents should aim to build “secure base[s]” (Goleman, 2006, p.164) for their children from which they will draw upon in future relationships. Goleman (2006) suggests that this can be accomplished by

providing empathy and responding to needs of the child in order for the child to know what it means to feel well-loved. This upbringing and facilitation of bonding will impact a child's future attachment style later in life.

Attachment is a lifelong cycle of nurturing, bonding, and relating to others through bonds and connection (Goleman, 2006), and it “provides the glue” (p. 189) that keeps people together. For instance, securely attached individuals have developed the ability to self-soothe in addition to seeking out or offering support within their relationships (Fishbane, 2013). These individuals have learned how to handle stress in healthier ways with appropriate coping mechanisms when compared to insecurely attached individuals (Fishbane, 2013). Insecure attachment styles, including the anxious/ambivalent, avoidant, and disorganized types, may have experienced troubles with bonding during developmental periods, which may complicate future social connections (Fishbane, 2013). OT plays a role in these styles of attachment as well. When ranking attachment security, those with a dosage of OT increased their ratings for security and decreased ratings for insecure attachments (Buchheim et al., 2009). Though OT may not be the sole cause for secure attachments, this hormone does strengthen the experience of them. The interplay between OT and positive, secure relationships reflects the innate human hardwiring for healthy attachments. Though attachments from childhood may remain relatively the same (Goleman, 2006), recognizing how we relate to one another, our children, or significant others is important. Understanding the powerful intersection of hormonal processes in bonding and attachment styles may help individuals draw upon securer bases to inform healthier connections in their relationships—despite childhood experiences.

Maternal Bonding

Our innate, human drive for connection first reveals itself where all life begins: birth. OT influences our yearning for connection, and coincidentally plays a significant role in childbirth. The pituitary gland releases OT, which contributes to waves of uterine contractions during the birthing process (Watson & Breddlove, 2019). With muscular spasms of the uterus, the baby's head pushes on the cervix and stimulates the release of even more OT for increased contractions until the mother finally has the baby (Watson & Breddlove, 2019). Once the mother finally has the child, bonding behavior soon begins.

Professionals in today's medical world recognize the importance of this bonding. After birth, the new baby is usually placed on the mother's, father's, or caregiver's chest to facilitate the earliest moments of connection in life (Fishbane, 2013). OT mediates this relationship between skin-to-skin contact and attachment development (Fishbane, 2013). OT supports this beautiful bond of soothing and connection between mother (or other caregiver present at birth) and child (Cacioppo & Patrick, 2008). This deep bond formed so early in life speaks to our need for relationships with others.

The nuanced layers of OT continue to promote this positive attachment formation. Babies require connection for their survival, and as such, they are dependent on mothers or other caregivers (Lieberman, 2013). The sharp pain of separation is heard when babies cry out in distress since their survival depends on their bonding/relationship with another person (Lieberman, 2013). Resulting behaviors are often driven by the OT hormone. For instance, OT contributes to the milk letdown reflex in mothers where milk flows into the ducts of the breasts in order to feed her crying child (Watson & Breddlove, 2019). Moreover, the milk letdown reflex reflects the dual-sided human hardwiring for connection. When babies cry, milk lets down into

the breasts as a reflex to soothe and nourish the distressed child (Lieberman, 2013). In addition to increasing the flow of breast milk for the child's benefit, OT enhances the dilation of the mother's blood vessels to warm the skin of the baby as well as reducing the mother's blood pressure, making her more relaxed (Goleman, 2006). Goleman (2006) describes the beauty of this attachment as a "flood of loving feeling that every mother feels towards her baby—and so the primal biochemistry of protection and caregiving" (p. 216). OT works to establish important connections early on in life, which we depend upon for our survival. This basic role of the hormone continues throughout the life span, demonstrating the profound human need for connection at all times in life.

Even after the early months of life, attachments remain a vital part of child development. Research indicates that OT plays an important role in mediating maternal stress levels and resulting attachments, a benefit to both mother and child (Yirmiya et al., 2020; Feldman et al., 2007; Bick & Dozier, 2010.) In an attachment study, researchers discovered that OT may work to buffer stress and normalize those levels in a child by being physically close to the mother (Yirmiya et al., 2020). Consequently, when the mother (or perhaps caregiver) does not respond to a child's signals, she is not able to shield them from stress, which can impact their stress-buffering systems (Yirmiya et al., 2020). Additional research discovered that higher levels of OT in mothers, especially in the third trimester, and reduced cortisol levels were correlated with maternal behaviors, attachment, and repeated checking in on the newborn (Feldman et al., 2007). Interestingly, Bick and Dozier (2010) found that OT levels even increased in mothers who interacted with nonbiological children in response to situations that required maternal behavior. The rise in OT may have acted as a buffer to the mother's potential stress in order for her to approach the unfamiliar child to comfort him/her (Bick and Dozier, 2010). Researchers also suggest that the time spent previously with her own

biological child increased hormone levels, which supported prosocial behavior towards another child in need of help (Bick & Dozier, 2010). This literature indicates the role of OT in maternal proximity and bonding, resulting in feelings of reward once these needs are met (Yirmiya et al., 2020; Feldman, 2007; Bick & Dozier, 2010). Attachments and closeness seem to occur under conditions with lower stress and higher OT levels, which enable a mutual benefit of bonding for mother and child.

Loss of Parent-child attachments

Impacts of bonding are also evident in the loss—both perceived and actual—of these attachments, particularly among children with divorced parents. Individuals experiencing parental divorce demonstrated higher levels of insecure attachments and more favorable attitudes towards divorce (Braithwaite et al., 2016). It has been suggested that the experience of parental divorce negatively affects the OT levels of these children, which heightens the risk of improper or unhealthy attachment formation in adulthood (Boccia et al., 2021). Research has also found that OT can be negatively correlated with anxiety amongst adult individuals with parental divorce in their childhood (Boccia et al., 2021). This is concerning as these children transition into emerging adulthood, because parental divorce sets a precedent of distrust in close connections with other people. Conflict between parents can result in insecure attachment styles as well as reduced commitment and communication skills among their children (Braithwaite et al., 2016). The impact of a personal separation from familial bonds reduces a child's chance for relationship satisfaction with future romantic partners (Braithwaite et al., 2016). When children witness and even experience the loss of one of their earliest attachments, the results can be devastating, especially with regards to future relationships. Healthy, intimate connections improve our wellbeing in a powerful way. When these bonds weaken or break, the pain of

disconnection seeps into our lives, cruelly reminding us of the loss of important, life-giving attachments.

Romantic Bonding

Romantic attachments also reflect our innate desire to connect and to be known by another in an intimate way. Researchers discovered that plasma OT levels were higher—even double the amount (Schneiderman et al., 2014)—among individuals in new romantic relationships when compared to unattached single persons (Schneiderman et al., 2012; Schneiderman et al., 2014). This increase may reflect a rise in hormonal production at the start of a relationship and may also indicate the personality traits of individuals with higher OT levels, who may have greater chances of love and partnership (Schneiderman et al., 2012). The release of hormones in one partner also promotes the release of OT in the other (Schneiderman et al., 2014), potentially due to OT-driven behaviors like touch, proximity, and the reciprocity demonstrated in relationships (Schneiderman et al., 2012). OT acts as a bonding agent, syncing and cueing off of the hormonal responses in each partner (Schneiderman et al., 2014). These hormonal interactions and behaviors promote higher levels of empathy from partners, which continue to solidify pair bonds (Schneiderman et al., 2014). Consequently, research has discovered that increased initial levels of OT were correlated with a longer duration of a couple's relationship (Schneiderman et al., 2012). Conversely, lower levels of OT at the beginning of a relationship were associated with reduced levels of empathy, which contributed more to break ups (Schneiderman et al., 2014). Romantic relationships cue off of our relational design, and OT provides the drive for and the continuation of this special bonding.

OT as the “hormone of connection” facilitates attachment to strengthen and to promote social and romantic bonds with partners. Physical touch, driven by the release of OT, is an

important aspect of deepening romantic relationships (Cacioppo & Patrick, 2008). Close proximity as a result of this hormone seems to feedforward and prompts the release of even more OT, which reinforces social bonds (Cacioppo & Patrick, 2008). Attachment, physical closeness, and relational intimacy are seen in romantic couples, most evidently in sex. OT facilitates bonding and connection as it is released during sex and orgasm (Cacioppo & Patrick, 2008). This biological response decreases blood pressure and stress hormones while promoting closeness between partners during sex and the following resolution/reflection phase (Goleman, 2006). OT allows for close, relational intimacy to be achieved through the physical and emotional expressions of love in a relationship, especially shared by couples through sex.

Additionally, pathways in the brain interact with these hormonal responses, thus influencing romantic attachments. The heightened desire for being with one another in long-term relationships stems from activations of brain regions involving the dopamine reward pathways (Acevedo et al., 2012). Researchers found that maternal and romantic love activate similar brain regions, which also contain a high density of OT-producing cells (Acevedo et al., 2012). Scheele et al. (2013) discovered that OT may even enhance long-term pair bonding through the reward pathway. In their study, male participants who had received an OT treatment responded more positively to pictures of their partners' faces, seeing them as more attractive, than those pictures of unfamiliar women (Scheele et al., 2013). It seems that the reward pathway in the brain works with OT or at least shares similar neural pathways that promote long-term pair bonding, both romantic and parental in nature. These significant biological systems influencing attachment throughout our life continue to point towards the purpose in our design: created for connection.

Attachment to God

OT, our social hormone, continues to promote attachment even in our spiritual lives. This hormone has been positively associated with spirituality specifically among church attendees (Holbrook et al., 2015). Among those receiving a dosage of OT and participating in meditation, spirituality and positive emotions increased during the experiment and in the following week (Van Cappellen et al., 2016). Even among a specific population of people, OT seemed to influence spirituality. Amongst participants with HIV/AIDS, higher plasma OT levels were associated with increased spirituality and a sense of spiritual transformation (Kelsch et al., 2013). These levels are significant since spirituality works to decrease distress and emotions of fear (Holbrook et al., 2015). The interaction between spirituality and OT levels also indicates the dual benefits of social bonding at centers of worship through connection with others and God (Holbrook et al., 2015). OT is also correlated to felt support from God, and this bond mimics relationships with other people (Kelsch et al., 2013). Religion may offer social supports—as indicated by the presence of OT—in a spiritual way via connection with God.

Levels of spirituality and the benefits that individuals draw from these connections also reflect styles of attachment in faith-based contexts. It has been proposed that attachment to God may be correlated with biological and psychological systems involved in the reduction of stress in our bodies (Raj & Sim, 2020). Raj & Sim (2020) discovered that those securely attached to their faith may turn to God during stressful times, which aims to prevent stress levels from further escalation. Additionally, those demonstrating secure attachments to God are also more likely to present with a positive affect through healthy emotion-focused coping; whereas, avoidant and ambivalent attached individuals are associated with more negative affects due to dysfunctional coping mechanisms (Parenteau et al., 2019). Securely attached individuals may

feel that God helps them with their problems, and this allows them to use positive coping mechanisms—instead of dysfunctional ones like shame—to deal with challenging situations in life (Parenteau et al., 2019). Though attachment styles vary amongst people, our genetic makeup and hormonal systems still provide the opportunity of one day experiencing deep, spiritual connection with God.

However, our experiences, upbringing, and other life factors still influence our level of spirituality, which in turn impacts some of our daily functioning. Research discovered that those with weaker attachments to God experienced higher levels of psychological distress (Raj et al. 2020). Furthermore, a personally-held view of an unresponsive or indifferent God was correlated with higher levels of dysfunctional coping strategies, like self-blame, self-shaming, or substance use (Parenteau et al., 2019). Similarly, anxious attachments to God have been associated with negative religious coping mechanisms (Lang, 2016). These individuals may equate fear of separation or abandonment, influenced by previous life experiences, to God. As a result, avoidant behaviors may rise and detract from developing secure connections with spiritual practices or with God (Lang, 2016). Regardless of how one attaches to God, the opportunity for secure attachment still exists since OT operates in us to promote relationships with others and with God.

As previously mentioned, attachments significantly influence our behaviors and psychology throughout the life span. It should be noted that there is still hope—found in spiritual attachments—when our human bonds shift or are lost. Just like styles of attachment are seen in the context of parenthood or romantic relationships on a chronological continuum, the same is true for different experiences in one's timeline of attachment to God. Amongst older adults, who have lost parental, romantic, or friendship bonds, there were higher levels of attachment to God

since God may serve as a substitute in place of these lost connections (Cicirelli, 2004). Though our bonds with others may change, God still acts as an inviting source of attachment throughout life. Although our attachment to God may fluctuate, as humans, we will still be driven by OT to long for and to seek out connection with other people. It is a relational cycle that speaks to the purpose of our design. This desire to continually connect with others is written in our genetic makeup. As we delve deeper into this longing for relationships with others, we find that we have been biologically and psychologically designed to draw closer to God.

Psychology of Disconnection

Loneliness

Despite the biological inner workings that inspire us to engage with others or with God, we are not always equipped to prevent separation from others. There are times that we find ourselves alone, and the perception of this “subjective experience” (Cacioppo & Patrick, 2008, p. 5) may result in damaging behavioral and emotional responses. Loneliness is a cruel, silent enemy, inflicting sharp emotional and physiological pain (Cacioppo & Patrick, 2008). We thrive off of social connectedness to protect ourselves from isolation. However, loneliness strikes at our whole being by evoking pain, elevating our stress responses, and compromising immune functioning (Cacioppo & Patrick, 2008). Simultaneously, we also lose the benefits of OT that are associated with touch and comfort (Cacioppo & Patrick, 2008). When we are left without relationships or others to turn to, our sense of not belonging drives us to attach to *something*—oftentimes self-destructive in nature (Brown, 2017). Shame exacerbates loneliness, thus increasing the incidence of risky or harmful behaviors like substance abuse, eating disorders, depression, and more (Brown, 2010). Most often, a loss of relationships or profound loneliness sparks this internal drive to form bonds as a way to cope. Our bodies and minds signal to us that

something is not right—*something* is left empty or unattached. This speaks to the human need for connection as a whole. Though separation or circumstances of loneliness may not be always our fault or choosing, there are substantial consequences nonetheless that arise when hormonal pathways or psychological needs are disrupted.

Addiction

During times of loneliness, we often feel the sharp pain of separation from other people. We long for their presence and their comfort due to our innate nature that thrives off of social connections. However, when our sense of belonging remains unfulfilled, individuals may turn to forms of self-destruction, behaviors, or objects to remedy this unattached longing for connection (Brown, 2017). This unhealthy aftermath of loneliness “can [also] turn an unmet need for connection into a chronic addiction” (Cacioppo & Patrick, 2008, p. 8), especially in the presence of other risk factors. To soothe this unidentifiable longing, individuals forgo executive functioning by behaving in unhealthy ways (e.g., substance abuse, overeating, acting out sexually, excessive drinking, smoking) for immediate gratification (Cacioppo & Patrick, 2008). Interestingly yet dangerously, these choices, particularly drug use, mimic similar neural pathways and feelings of pleasure that are involved in our connections with other people (Goleman, 2006). Brown (2010) points out that “we cannot selectively numb emotions. When we numb the painful emotions, we also numb the positive emotions” (p. 70) in this vicious loop of loneliness and harmful behaviors. This cycle of loneliness that is “fixed” by a substance or behavior of some nature—instead of a relationship with a person or God—perpetuates the negative effects of separation. This contributes to the onset of serious psychological issues: substance abuse and addiction.

Our understanding of addiction arises from certain models outlined in the field of psychology. Each take on a different approach to explain the development of addiction. The moral model attributes the onset of addiction to a person's weakness or lack of self-control; whereas, the disease model views addiction as a health condition without clear origins, requiring medical treatment or rehabilitation (Watson & Breddlove, 2019). The physical dependent model emphasizes an affected individual's need to continue using a substance to avoid withdrawal, thus developing a dependency and tolerance to the object (Watson & Breddlove, 2019). Finally, addiction may also be explained by the positive reward model, where certain substances, like drugs, cause dopamine release, and the addictive behavior is now imbued with a pleasurable quality, which acts as a powerful reinforcement (Watson & Breddlove, 2019). Whichever model one may affirm, it would seem that a person develops an attachment with the substance or "object" that they are addicted to, which creates further unhealthy behaviors.

This raises the question of what prompts an addictive behavior, and why are some more addicted than others? Biological (e.g., being male), psychological (e.g., personality), and environmental (e.g., poor family life or neighborhood) factors do contribute to the prognosis of addictive behaviors, but where does the addiction start (Watson & Breddlove, 2019)? There may be many answers and explanations to this complicated question. Within the scope of this paper, let us cautiously ask: how addiction is related to our desire for connection? Along this line of inquiry, Cohen (2009) proposes a new way of viewing behaviors associated with addiction since they reflect normal, human patterns of bonding. He argues that bonding—in many ways—is unavoidable. Yet, societies do not readily acknowledge this. The resulting social rhetoric concerning addiction leads to the stigmatization of affected individuals, which continues to isolate them from healthy attachments to communities (Cohen, 2009). Societies construct and

impose narratives surrounding addiction, without ever realizing that the yearning for different substances stems from a universal longing for attachment. If we recognized that these bonding pathways exist in all of us as part of the human experience, we could potentially alter our understanding and preconceived notions of addiction in order to better aid and promote effective treatment of those struggling with substance abuse.

Similarly, other researchers have turned away from traditional or socially/politically accepted models of addiction towards a viewpoint that acknowledges the need for connection. Hari (2015) proposes that addiction may be less about chemicals as society thinks and perhaps more about the effects of isolation or “dislocation” (p. 174). Hari (2015) cites Bruce Alexander’s experiment known as Rat Park. In this study, one rat is placed in isolation in a cage with a water bottle and a morphine bottle to drink from. In the other cage, called Rat Park, rats enjoy the company of other rats, toys, wheels, and food while also still having access to one bottle with water and another with morphine (Hari, 2015). The isolated rats developed an addiction to the morphine drink, but the rats in Rat Park—though they had access to the morphine—did not become addicted and used very little morphine of the morphine drink. Hari (2015) suggests that “addiction isn’t a disease. Addiction is an adaptation. It’s not you—it’s the cage [or environment] you live in” (p.172). To further this idea, when researchers transferred an isolated, addicted rat to Rat Park, it experienced some withdrawal symptoms and stopped drinking from the morphine bottle. This animal model again suggests that isolation affects a biological need for social bonding and may even replace this desire with substances in harmful ways.

Society’s response to addiction also contributes to the ill effects of disconnection and deepens the experience of addicts. When individuals feel isolated by society or culture, addiction provides a way to escape these feelings of loss. A new bond will form in response (Hari, 2015).

Humans require bonding for their survival and overall health, and this innate, biopsychological need will drive individuals to fulfill it with a behavior or substance that will provide relief. When addicts are cut off from drugs, treatment of solely withdrawal symptoms (and not the root problem) continues to isolate individuals and may deprive them of social bonds due to the social stigmatization of addiction (Hari, 2015). Consequently, their unresolved attachment to drugs, especially more extreme ones, leads them to connect with the harmful subculture of substance abuse. A community, rooted in addiction, provides users with skewed meaning, purpose, and identity (Hari, 2015). This entrenches individuals in addiction and deepens their bonds with their substances. Though “chemical hooks” exist in the cycle of substance abuse, addiction exploits the human need for relationships, especially in isolating, prohibitory social environments.

Current literature alludes to these correlations between relational attachments, especially early in life, and the onset of addictive behaviors. Among adolescents, poor family attachment has been associated with reduced school attachment, which results in higher involvement with friends using drugs (Henry, 2008). Ultimately, being surrounded by these friends results in a higher probability of drug usage (Henry, 2008). Additionally, Liese et al. (2020) discovered that anxious styles of attachment were linked to alcohol and marijuana use. Researchers speculated that these individuals turned to these substances due to increased anxiety and lack of attachment figures (Liese et al., 2020). Addictive behaviors may soothe these intense emotional responses of anxiety (Liese et al., 2020). Those with this insecure attachment styles may have an increased risk of developing a future addiction as a consequence of unattachment or adverse experiences during childhood (Liese et al., 2020; Henry, 2008; Strathearn et al., 2019). As previously mentioned, these emotions often signal us to rely on our attachments or seek connections with

others. Yet, if these relationships are not available or do not exist, some people will form attachments with inappropriate “objects” rather than other people or God.

It is also worth exploring the nature of OT and bonding, especially when forming attachments to substances. OT, as part of the emotional regulation system, fosters connections while providing positive reinforcements for social behavior (Strathearn et al., 2019). If early life experience (e.g., lack of parental bonding) impacts the OT system, a person may have troubles with social behaviors and attachments (Strathearn et al., 2019). Without forming these attachments, the needs of the OT system go unmet, which may increase the risk for seeking alternative methods of satisfaction. Furthermore, loneliness or reduced social support increases the probability of becoming addicted or relapsing (Strathearn et al., 2019). Again, we see an increase in a negative emotional response in these contexts without the positive, mediating effects of OT to prevent substance abuse. Simultaneously, Strathearn et al. (2019) suggest that at the level of addiction, the OT system may even work to familiarize a person with the abused substance, so an attachment does form. Addiction seems to exploit the human need for attachment by potentially manipulating the OT to form bonds with harmful substances.

Although addiction may affect certain pathways, current research suggests potential benefits of OT in alcoholism treatment. When given to nontreatment-seeking individuals with alcoholism, administration of OT improved their social perceptual skills (Michetll et al., 2016). This may enhance these individuals’ abilities to seek out social support. OT has been associated with decreased cravings for alcohol, especially amongst anxiously attached individuals (Michetll et al., 2016). Researchers have also discovered that OT may prevent alcohol withdrawal symptoms (Pedersen et al., 2013), cue-reactivity/desire activation (Hansson et al., 2018), and relapse due to the hormone’s protective/buffering role against stress and anxiety (Pedersen et al.,

2013). Further research is recommended in this intersection of alcoholism treatment and the effects of OT in order to understand how OT may meet social needs while also decreasing the desire for alcohol.

Other research has studied the effects of OT in the context of drug abuse and addiction. Social attachments and the mediating effects of OT may help individuals struggling with addiction to switch from novelty responses towards drugs to reactions associated more with familiarity (Tops et al., 2014). As novelty responses diminish, there may be a reduction in cue reactivity to drugs as well (Lee et al., 2014). Conversely, lower levels of OT may also be correlated with increased novelty-seeking behaviors, which precede addiction (Stauffer et al., 2016). The OT-mediated shift from novelty to familiarity helps decrease impulsive behaviors, which can be effectively replaced by healthy attachments and coping mechanisms (Tops et al., 2014). This resiliency may also protect individuals from stressors that potentially trigger relapses (Tops et al., 2014). Similarly, OT has also been implicated in the treatment of symptoms associated with drug addiction. Stauffer et al., (2016) discovered that among treatment-seeking cocaine users, those given intranasal dosages of OT indicated a reduction in cravings, a decreased urge to use, and a trend towards a decrease in cocaine use over time. Additionally, within this socially supportive treatment study, those in the OT group were more likely to honestly self-report their cocaine use, given the trustworthiness of their social environment (Stauffer et al., 2016). Although more research is needed in the field of OT and drug addiction, research suggests the importance of social connection and attachment for treatment.

Though the relationship between OT pathways and addiction is not explicitly clear, the preliminary benefits of OT in treatment settings and in community support suggest a link between the innate desire for connection and the exploitation of this need through addiction.

From a non-medical view of treatment, community and religious activities provide social support and may serve as preventative and recovery strategies for those experiencing addiction (Grim & Grim, 2019). The OT system provides rewards for us when we seek connection with other people. Social supports act as protective factors from developing certain disorders, but community ties may also be important in recovery. As a protective factor, spirituality may decrease the likelihood of partaking in substance abuse behaviors (Grim & Grim, 2020). For instance, religious adolescents were less likely to use marijuana, and their involvement in a religious community reduced the probability of future and consistent drug and alcohol use (Ulmer et al., 2012). Research indicates that adolescents who are a part of a faith community and its concurrent activities may develop resiliency and healthy coping mechanisms that do not consist of alcohol or drug abuse (Grim & Grim, 2020). Robinson et al. (2007) also found that among those in treatment for alcohol use disorder, participation in private spiritual practices like prayer, meditation, and forgiveness (of self and others) predicted improved outcome for participants with alcohol use disorder (Robinson et al., 2011). Additionally, daily experiences of God, spiritual growth (associated with religion, theism, or a non-theistic approach), and an increased purpose for life were correlated with a reduction in heavy alcohol use (Robinson et al., 2007). Fricchione (2014) further suggests that spirituality provides protection from isolating experiences that lead to these addictive behaviors. Though, without attachment to others, some may still seek to fill this painful loss with alcohol or other substances, which continues to isolate them from connection (Fricchione, 2014). Organizations with spiritual influences, like Alcoholics Anonymous, counter this problem by connecting participants with sponsors and communities. Spirituality or the “connectedness to something greater than oneself and a belief in the essential goodness of such a connection” (Fricchione, 2014, p.190) may further prompt

individuals to seek out more fulfilling and life-giving attachments rather than the unsatisfying and damaging bonds of addiction.

Related Psychological Disorders

It is important to acknowledge the consequences of potential loneliness and lean into our desires to be connected to one another. To a degree, closeness with others protects us from emotional disorders like social depression, rejection, and anxiety (Goleman, 2006; Lieberman, 2013). Importantly, our bodies do try to respond to isolating experiences by releasing OT (Chu et al., 2020). This hormone will drive us towards others in order to resolve disconnection before the psychological consequences of separation manifest (Chu et al., 2020). However, in the field of psychology, we continue to see the effects of loneliness and the disruption of social bonds as presented by some psychological disorders.

Among these psychological disorders, OT pathways continue to operate in ways that aim to alleviate the severity of mental health outcomes; however, these systems are often dampened or dysregulated in severer mental illnesses. Considering the social withdrawal or exclusion symptoms associated with diagnoses of anxiety or depression, the OT system may still benefit these individuals. For instance, in a previous research study, OT levels rose as those with social anxiety disorder tried to interact more with others (Hoge et al., 2008). This suggests that the hormone system upregulated OT as a way to facilitate social interaction and reduce feelings of anxiety (Hoge et al., 2008). However, there is an extent to which OT and social supports, among many other factors, can effectively protect against loneliness and the onset of mental illnesses.

As the severity of symptoms progresses, either as a result of prolonged separation or a mental health diagnosis, the OT system may not be able to protect someone as efficiently from disconnection. This results in a decrease in hormone levels (Lebowitz, 2016; Tsai et al., 2016;

Jobst et al., 2015; Jahangard et al., 2020; Bertsch et al., 2013) and thus a rise in withdrawal behaviors associated with illnesses like depression (Jahangard et al., 2020). This is seen in children with separation anxiety disorder who presented with lower levels of OT after demonstrating anxious behaviors when interacting with their mothers (Lebowitz, 2016). This decrease in OT levels during experiences of separation prompts children to seek safety in attachment (Lebowitz, 2016). However, when caregivers are unable to meet this need, OT levels continue to drop while anxious behaviors rise (Lebowitz, 2016). OT also functions in pathways associated with depression. Among participants with major depressive disorder, in the OT treatment group, lowered social support was correlated with higher levels of loneliness and cortisol (Tsai et al., 2019). Researchers suggest that this hormone may act as a buffer to promote social support and decrease loneliness (Tsai et al., 2019). Yet, this buffering effect only works successfully if sufficient amounts of OT are released in individuals with major depressive disorder (Tsai et al., 2019). In patients with chronic depression, OT levels were also reduced (Jobst et al., 2015; Jahangard et al., 2020) following an experimentally designed exclusion scenario (Jobst et al., 2015). This reduction may create additional difficulties among those with chronic depression to cope with negative social experiences (Jobst et al., 2015) and overcome social withdrawal (Jahangard et al., 2020). This trend is also evident in lower levels of OT in women with bipolar disorder, whose lowered hormone levels were associated with a history of childhood trauma or abuse and aggressiveness (Bertsch et al., 2013). Though OT does not mediate the relationship between bipolar disorder and past trauma, researchers acknowledge that the hormonal pathway functions abnormally and may be linked to social deficits in these patients (Bertsch et al., 2013). Amongst presentations of anxiety, depression, and bipolar disorder, there is a lack of connection that impacts the onset or severity of these disorders. Though causality and

directionality between the OT pathway and mental illnesses are not concrete, we still must acknowledge the human reliance on social supports, especially during our darkest times.

In significant times of deep loneliness, our innate longing for relationships and connections are no longer heard and remain unmet, empty. It is here where some people enter into a terrifying place of seeking disconnection from all relationships, the world, and themselves. Although feelings of isolation may trigger the OT pathway to drive individuals towards social connection in order to prevent the ill effects of separation, sometimes other factors—besides hormonal ones—influence the outcome of these traumatic experiences (Chu et al., 2020). Isolation, negative social experiences, and feelings of not belonging have been linked to this dark place, one of the severest forms of human disconnection: suicide (Chu et al., 2020). Previous research has discovered that those with current and recent suicide attempts had lower levels of OT circulating throughout their bodies (Jahangard et al., 2020; Jokinen et al., 2012). Furthermore, OT levels remained lowered in those who had attempted suicide for up to 12 weeks later, indicating the social and emotional difficulty in the aftermath of processing a suicide attempt (Jahangard et al., 2020). In an unfortunate cycle of events, these individuals may struggle with establishing healthy connections again, which leads to continued feelings of guilt and ostracization (Jahangard et al., 2020). In a social exclusion research scenario, those with prior suicide attempts continued to present lowered levels of OT and also a reduced desire for support (Chu et al., 2020). Researchers explained that these at-risk individuals may have had more negative social experiences and/or have had alterations in OT expression, both of which result in changes to the OT pathway (Chu et al., 2020). Resultingly, this minimizes the desire for any emotional or social support, thus heightening the effects of loneliness and suicide risk (Chu et al., 2020). Though the interaction of the OT pathway in individuals calls into question nature (e.g.,

altered genetic expression) vs. nurture (e.g., negative social impacts on the hormonal system), it is clear that a lack of social supports and connection increases the risk of life-threatening behaviors. As humans, we live to connect. When we are unable to fulfill this innate longing, the consequences truly are lethal.

In this discussion of mental illnesses, we must acknowledge that psychological disorders cannot be reduced down solely to the interworking of our bodies' hormonal systems, namely that of OT alone. Convergences between biological, psychological, social, and environmental factors all contribute to the development or severity of a mental illness. Although we may not be able to pinpoint the directionality between OT and the psychological impacts of disconnection on mental health, social supports still enhance the quality of our lives. The purpose of this section and paper as a whole is to illuminate the importance of connection among all individuals—no matter a person's diagnosis. This innate desire for community and the positive effects of healthy attachments with others speaks to our purposeful, relationship-oriented design.

Spiritual Implications

From both biological and psychological perspectives, we see the importance of connection and relationships with others. Though there are numerous factors and pathways involved in this general aspect of our humanity, OT plays a unique role in attachments. Current research also alludes to the involvement of this hormone within parts of our spiritual lives. Hardwiring in all of us contributes to our desire for relationships with one another—and perhaps to something even greater. Nonetheless, it is challenging to name these longings specifically, especially in the context of spirituality. Despite the mystery of our yearnings, our makeup reflects a higher purpose and significance of our creation.

Our Divine design draws us towards this mysterious or mystical desire for deep connection. C.S. Lewis, a Christian author and theologian, examines this concept in his essay “The Weight of Glory.” Initially, Lewis (1949) asserts that “if we are made for heaven, the desire for our proper place will be already in us, but not yet attached to the true object” (p. 29). He describes a desire that leaves us longing for something more, but Lewis does not name this object of longing readily in his essay. Lewis plays with the concept of *Sehnsucht*, which is a mystical, unnamed and inconsolable longing that draws us close to something. It is an abstract idea that signifies the attachment of a universal human yearning to a central object. Yet, this complex concept sparks our interest concerning the true object of our longing. Coincidentally, Lewis does not initially reveal what this object is to the audience. This intentional style of writing reflects our own human nature of yearning for something more, without knowing what it truly is we desire. This suggests that our innate longing may be an unfolding process. We have begun to understand the significant drive for connection in part due to OT, yet there is still more to uncover through this interdisciplinary approach.

As mentioned in the discussion of psychological attachments (to other people and substances), humans search for the proper object that will satisfy this unnamable longing. Some may turn to their parental or romantic bonds while others may begin using various substances. There is a biological push for connection in order to fill a spiritual need. The spiritual, biological, and psychological drives and needs all intertwine with a yearning that humans may not be fully equipped to satisfy. In some instances, this presents itself as the desire to be attached to other people and to engage in relationships. However, some relationships may be insufficient or harmful at times, leaving the yearning unsatisfied. When humans do not attach to this proper object that Lewis talks of in his essay, “rival” objects may take its place (Lewis, 1949, p. 29).

Some may then seek to fill this void or unnamable longing with improper objects and destructive behaviors, which research poses may lead to separation, isolation, and serious mental health presentations. Current literature implies that OT contributes to the pathways of attachment. The reduction, ineffectiveness, and absence of this hormone is associated with the negative consequences of disconnection. If these biological systems impact all of our lives, this signifies the importance of creating stronger and more rewarding attachments, instead of ones that leave us longing for more. Similarly, Lewis (1949) argues that “if a transtemporal, transfinite good is our real destiny [as reflected in our makeup], then any other good on which our desire fixes must be in some degree fallacious, must bear at best only a symbolic relation to what will truly satisfy” (p. 29). Following Lewis’s argument and research concerning biopsychological attachments, our capacity for greater connection suggests that an even greater object of attachment exists, one that offers us all a proper and satisfying relationship.

In this respect, relationships comprise much of the human experience as seen in our bonds with people or “objects” like food, material possessions, dreams, or even harmful substances/practices. From a Christian vantage point, relationships existed at the very beginning of it all, well before the creation of the first human beings. Gospel-writer, John, provides us with a glimpse of this at the beginning of his book, writing, “In the beginning was the Word, and the Word was with God, and the Word was God. He [referring to Jesus] was with God in the beginning” (*NIV*, 2011/1973, John 1:1-2). God—in plural, Father, Son, and Holy Spirit—existed before humankind. The three members of the Trinity demonstrate a critical essence of who we are: relational (Rohr & Morrel, 2016). The Godhead exists in relationship between the three, thus emphasizing the significance of connectedness. Furthermore, in Genesis 1:26a, 27 (*NLT*, 2015/1996), God says, “Let us make human beings in our image, to be like us’...So God created

human beings in his own image. In the image of God he created them; male and female he created them.” From humanity’s birth, God intended for us to be interpersonal creatures. The Triune God exemplifies longing and engaging in relationships, and as such created us in His image—with that same desire for connection. Additionally, since God determined that it was not good for Adam to be alone (*NIV*, 2011/1973, Genesis 1:18), he created Eve, so that the two might share a bond, in addition to the bond that attached them to God. Before it all, there was God; there was love; and there were relationships. These provide the foundation of our human existence and experience.

Perhaps our intentionally relational design in the image of God informs how we are drawn towards community due to the involvement of OT. God exists in community as part of the Trinity, and as part of our biology, we long for the same. OT promotes social behavior and drives us towards connection in times of stress and anxiety in order to protect us from the harm of isolation and unhealthy coping mechanisms. The social support of a community—at times influenced by OT (Michetll et al., 2016)—mediates and acts as a protective factor against the development or relapse of addiction (Grim & Grim, 2019; Michetll et al., 2016; Strathearn et al., 2019) and mental illnesses (Goleman, 2006; Lieberman, 2013; Jahangard et al., 2020; Chu et al, 2020). We are drawn to connect with others as a means of safeguarding our wellbeing. God included this hormonal pathway among other biopsychological factors in our design to promote attachments. The presence of these systems and our yearning for connections implies the intentional existence of some all-rewarding, ultimate relationship to one day discover.

Although not touched upon in this paper as relating to OT, our desire for beauty in the world also reflects our innate longing for connection. We desire to be a part of the beauty we see—to be one with it. Rohr and Morrel (2016) capture this sentiment in that “we are naturally

drawn to lovely things outside and beyond ourselves, and we want to rush toward them and unite with them in almost any way...” (p. 92). There is a longing in us that sees the beauty and value around us as worthy of our attention and attachment. Could this speak of the true and proper object that Lewis argues is the heart of our innate longing? Similarly, Goleman (2006) explains that our human capacity for attachment and the underlying circuits “may be at work to one extent or another in larger realms, like spiritual longing or an affinity for open skies and empty beaches” (p. 190). Something in our connections with others and beauty in nature draws us forward towards our proper object of attachment. What is this beauty of Creation and our relationships reflective of? Or is the better question, *who* is it reflective of? When trying to answer this question, we are brought into a realm of mystical thinking. It is as if we are drawn in closer and closer to the object of our longing before we know what it is. It is like a mysterious invitation into a relationship where our secret longing will finally be revealed.

Ultimately, our longing for beauty and connection stems from our creation in the likeness of God, who wants to be in relationship with us. This is central to our innate longing. Though it is a gradual process of recognizing and naming this desire, our genetic makeup and resulting desires reflect our proper object: *union with God*. Throughout life, we attach to our parents, friends, significant others, and even neutral or harmful objects. This capability of attachment, understood through a biopsychological lens, mirrors our creation at the hands of a relational God. We were created to connect with Him, and this spills out into our relationships with others as well. It may be a gradual process of orienting our hearts towards God, but the capacity to do so is there, written in our biological makeup.

The OT system demonstrates the purpose of our creation: to be in relationship with God. Our desires for attachment with one another, nature, and other objects reflect our spiritual need

to find comfort and fulfillment when united with God. Often, we have this desire, “still wandering and uncertain of its object and still largely unable to see that object in the direction where it really lies” (Lewis, 1949, p. 33). We do not recognize or are unable to name this longing, so we connect to objects that may satisfy us. Delving deeper into a biopsychological approach may help us define our creation and the purpose behind our attachments, which are reflective of a heavenly bond intended between us and God. Research does indicate the chronology of our behaviors surrounding attachments, the benefits of social supports and communities (including religious ones), and the consequences of unattachment. The presence of the hormone, OT, in all of these suggests a biological significance behind our spiritual need to connect.

In addition to spiritual reasoning and faith, human psychophysiological systems demonstrate that “all humans have the capacity to draw near to God” (Downing, 2005, p. 16) and experience the full presence of the Lord. It is an unfolding and challenging process of deriving meaning from these abstract and multi-faceted concepts, because individuals must put themselves and their worldly desires aside. Downing (2005) calls this stage “purgation.” Then through “illumination,” a person may then start to grasp onto deeper meanings within spirituality that are outside of “ordinary reasoning” (Downing, 2005, p. 82). This paper, in part, serves to illuminate the intersection of psychophysiological processes and spirituality in order to expand our understanding of faith and God’s purposes for us. Finally, Downing (2005) concludes that when we reach this level of understanding, we enter into the stage of “union,” “a state of rest in which one’s will is continuously at unity with God’s will” (p. 82). It is comforting to know that our longing for community and connection points us towards a relationship with God. In Him, we find true rest, steadfast attachment, and fulfillment of all our yearnings.

Interestingly, as a person draws closer to God, that individual “will naturally mirror [God’s] character, including His unbounded love for human beings” (Downing, 2005, p. 25). God biologically wired us to seek connection with Him, and in so doing, we are drawn into relationship with others around us at the same time. Moreover, as creatures made in His image, we live as mirrors of God with shared desires. Thus, connecting with other people may gradually reveal to us the “image [or purpose of God] that we reflect” (Rohr & Morrel, 2016, p.51). When we consciously seek out a relationship with God, He offers us a life of redemption, loving attachment, and transformation. This concept is further emphasized by Scripture:

“But whenever anyone turns to the Lord, the veil is taken away. Now the Lord is the Spirit, and where the Spirit of the Lord is, there is freedom. And we all, who with unveiled faces contemplate the Lord’s glory, are being transformed into his image with every-increasing glory, which comes from the Lord, who is the Spirit” (*NIV*, 2011/1973, 2 Corinthians 3:16-18).

Intentional connection with God enables us to live a renewed life of freedom and purpose, further invigorated to serve and to connect with others. Our biopsychological makeup supports this spiritual revelation and will continually drive us towards community with others and God.

God offers us an open invitation into a relationship with Him. The invitation is written in our genetic makeup and is exemplified in some of our psychological behaviors. We desire to be attached to something, some object that often remains unnamed or unrecognized. Resultingly, analysis of the OT system signifies the heightened value and meaning behind our connections with others, which then points us towards a heavenly bond with God. It is important to integrate these interdisciplinary domains, especially in the context of spirituality, in order to realize “that we are all inextricably connected to each other by a power greater than all of us..., [and]

spirituality brings a sense of perspective, meaning, and purpose to our lives” (Brown, 2010, p. 54). The unfolding revelation of hormonal driven processes, desires, and behaviors reveals to us our innate longing for connection with one another and ultimately with God. Properly aligned in the orientation of our longing, in accordance with our biopsychological makeup, we will experience the most satisfaction, love, and glory when we are finally united with God.

References

- Acevedo, B. P., Aron, A., Fisher, H. E., & Brown, L. L. (2012). Neural correlates of long-term intense romantic love. *Social Cognitive and Affective Neuroscience*, 7(2), 145–159. <https://doi.org/10.1093/scan/nsq092>
- Bertsch, K., Schmidinger, I., Neumann, I. D., & Herpertz, S. C. (2013). Reduced plasma oxytocin levels in female patients with borderline personality disorder. *Hormones and Behavior*, 63(3), 424–429. <https://doi.org/10.1016/j.yhbeh.2012.11.013>
- Bick, J., & Dozier, M. (2010). Mothers' concentrations of oxytocin following close, physical interactions with biological and nonbiological children. *Developmental Psychobiology*, 52(1), 100–107. <https://doi.org/10.1002/dev.20411>
- Boccia, M. L., Cook, C., Marson, L., & Pedersen, C. (2021). Parental divorce in childhood is related to lower urinary oxytocin concentrations in adulthood. *Journal of Comparative Psychology*, 135(1), 74–81. <https://doi.org/10.1037/com0000248>
- Braithwaite, S. R., Doxey, R. A., Dowdle, K. K., & Fincham, F. D. (2016). The unique influences of parental divorce and parental conflict on emerging adults in romantic relationships. *Journal of Adult Development*, 23(4), 214–225. <https://doi.org/10.1007/s10804-016-9237-6>
- Brown, B. (2010). *The gifts of imperfection: Let go of who you think you're supposed to be and embrace who you are*. Hazelden Publishing.
- Brown, B. (2017). *Braving the wilderness*. Penguin Random House LLC.
- Buchheim, A., Heinrichs, M., George, C., Pokorny, D., Koops, E., Henningsen, P., O'Conner, M., & Gundel, H. (2009). Oxytocin enhances the experience of attachment security.

Psychoneuroendocrinology, 34(9), 1417–22.

<https://doi.org/10.1016/j.psyneuen.2009.04.002>

Cacioppo, J.T., & Patrick, W. (2008). *Loneliness: Human nature and the need for social connection*. W.W. Norton.

Chu, C., Hammock, E. A. D., & Joiner, T.E. (2020). Unextracted plasma oxytocin levels decrease following in-laboratory social exclusion in young adults with a suicide attempt history. *Journal of Psychiatric Research*. 121,173-181.

<https://doi.org/10.1016/j.jpsychires.2019.11.015>

Cicirelli, V. G. (2004). God as the ultimate attachment figure for older adults. *Attachment & Human Development*, 6(4), 371–388. <https://doi.org/10.1080/1461673042000303091>

Cohen, P. (2009). The naked empress: Modern neuro science and the concept of addiction.

Cedra. <https://seekhealing.org/downloads/Dr.Peter.Cohen.research-.The.naked.empress.pdf>

Downing, D. (2005). *Into the Region of Awe*. Intervarsity Press.

Feldman, R., Weller, A., Zagoory-Sharon, O., & Levine, A. (2007). Evidence for a neuroendocrinological foundation of human affiliation: Plasma oxytocin levels across pregnancy and the postpartum period predict mother-infant bonding. *Psychological Science*, 18(11), 965–970. <https://doi.org/10.1111/j.1467-9280.2007.02010.x>

Fishbane, M.D. (2013). *Loving with the brain in mind: Neurobiology and couple therapy*. W.W. Norton & Company.

Fricchione, Gregory (2014). The neurocircuitry of attachment and recovery in Alcoholics

Anonymous. *Alcoholism Treatment Quarterly*, 32(2-3), 173-193.

<http://dx.doi.org/10.1080/07347324.2014.907019>

- Goleman, D. (2006). *Social intelligence: The new science of human relationships*. Bantam Books.
- Grim, B., & Grim, M. (2019). Belief, behavior, and belonging: How faith is indispensable in preventing and recovering from substance abuse. *Journal of Religion and Health, 58*(5), 1713-1750. <https://doi.org/10.1007/s10943-019-00876-w>
- Hansson, A. C., Koopmann, A., Uhrig, S., Bühler, S., Domi, E., Kiessling, E., Ciccocioppo, R., Froemke, R. C., Grinevich, V., Kiefer, F., Sommer, W. H., Vollstädt-Klein, S., & Spanagel, R. (2018). Oxytocin reduces alcohol cue-reactivity in alcohol-dependent rats and humans. *Neuropsychopharmacology, 43*(6), 1235–1246. <https://doi.org/10.1038/npp.2017.257>
- Hari, J. (2015). *Chasing the scream: The first and last days of the war on drugs*. Bloomsbury.
- Heinrichs, M., Baumgartner, T., Kirschbaum, C., & Ehlert, U. (2003). Social support and oxytocin interact to suppress cortisol and subjective responses to psychosocial stress. *Biological Psychiatry, 54*(12), 1389–1398. [http://dx.doi.org/10.1016/S0006-3223\(03\)00465-7](http://dx.doi.org/10.1016/S0006-3223(03)00465-7)
- Henry, K. L. (2008). Low prosocial attachment, involvement with drug-using peers, and adolescent drug use: A longitudinal examination of mediational mechanisms. *Psychology of Addictive Behaviors, 22*(2), 302–308. <http://dx.doi.org/10.1037/0893-164X.22.2.302>
- Hoge, E. A., Pollack, M. H., Kaufman, R. E., Zak, P. J., & Simon, N. M. (2008). Oxytocin levels in social anxiety disorder. *CNS Neuroscience & Therapeutics, 14*(3), 165–170. <http://dx.doi.org/10.1111/j.1755-5949.2008.00051.x>

- Holbrook, C., Hahn-Holbrook, J., & Holt-Lunstad, J. (2015). Self-reported spirituality correlates with endogenous oxytocin. *Psychology of Religion and Spirituality*, 7(1), 46–50.
<http://dx.doi.org/10.1037/a0038255>
- Jahangard, L., Shayganfard, M., Ghiasi, F., Salehi, I., Haghghi, M., Ahmadpanah, M., Sadeghi Bahmani, D., & Brand, S. (2020). Serum oxytocin concentrations in current and recent suicide survivors are lower than in healthy controls. *Journal of Psychiatric Research*, 128, 75–82. <http://dx.doi.org/10.1016/j.jpsychires.2020.05.014>
- Jobst, A., Sabass, L., Palagyi, A., Bauriedl-Schmidt, C., Mauer, M. C., Sarubin, N., Buchheim, A., Renneberg, B., Falkai, P., Zill, P., & Padberg, F. (2015). Effects of social exclusion on emotions and oxytocin and cortisol levels in patients with chronic depression. *Journal of Psychiatric Research*, 60, 170–177. <http://dx.doi.org/10.1016/j.jpsychires.2014.11.001>
- Jokinen, J., Chatzittofis, A., Hellström, C., Nordström, P., Uvnäs-Moberg, K., & Åsberg, M. (2012). Low CSF oxytocin reflects high intent in suicide attempters. *Psychoneuroendocrinology*, 37(4), 482–490.
<http://dx.doi.org/10.1016/j.psyneuen.2011.07.016>
- Kelsch, C. B., Ironson, G., Szeto, A., Kremer, H., Schneiderman, N., & Mendez, A. J. (2013). The relationship of spirituality, benefit finding, and other psychosocial variables to the hormone oxytocin in HIV/AIDS. *Research in the Social Scientific Study of Religion*, 24, 137-162. http://dx.doi.org/10.1163/9789004252073_007
- Láng, A. (2016). Relationship between recalled parental care and religious coping: The mediating effect of attachment to God. *European Journal of Mental Health*, 11(1–2), 144–150. <http://dx.doi.org/10.5708/EJMH.11.2016.1-2.9>

- Lebowitz, E. R., Leckman, J. F., Feldman, R., Zagoory-Sharon, O., McDonald, N., & Silverman, W. K. (2016). Salivary oxytocin in clinically anxious youth: Associations with separation anxiety and family accommodation. *Psychoneuroendocrinology*, *65*, 35–43.
<http://dx.doi.org/10.1016/j.psyneuen.2015.12.007>
- Lee, M. R., Glassman, M., King-Casas, B., Kelly, D. L., Stein, E. A., Schroeder, J., & Salmeron, B. J. (2014). Complexity of oxytocin's effects in a chronic cocaine dependent population. *European Neuropsychopharmacology*, *24*(9), 1483–1491.
<http://dx.doi.org/10.1016/j.euroneuro.2014.06.005>
- Liese, B. S., Kim, H. S., & Hodgins, D. C. (2020). Insecure attachment and addiction: Testing the mediating role of emotion dysregulation in four potentially addictive behaviors. *Addictive Behaviors*, *107*. <http://dx.doi.org/10.1016/j.addbeh.2020.106432>
- Lewis, C.S. (1949). *The weight of glory: And other addresses*. HarperOne.
- Lieberman, M.D. (2013). *Social: Why our brains are wired to connect*. Broadway Books.
- Michetll, G., Arcuni, P., Weinstein, D., & Woolley, J. (2016). Intranasal oxytocin selectively modulates social perception, craving, and approach behavior in subjects with alcohol use disorder. *Journal of Addiction Medicine*, *10*(3), 182-189.
<http://dx.doi.org/10.1097/ADM.0000000000000213>
- The Holy Bible, New International Version*. (2011). Zondervan. (Original work published 1973).
- Holy Bible, New Living Translation*. (2015). Tyndale House Foundation. (Original work published 1996).
- Parenteau, S. C., Hurd, K., Wu, H., & Feck, C. (2019). Attachment to God and psychological adjustment: God's responses and our coping strategies. *Journal of Religion and Health*, *58*(4), 1286–1306. <http://dx.doi.org/10.1007/s10943-019-00765-2>

- Pedersen, C. A., Smedley, K. L., Leserman, J., Jarskog, L. F., Rau, S. W., Kampov-Polevoi, A., Casey, R. L., Fender, T., & Garbutt, J. C. (2013). Intranasal oxytocin blocks alcohol withdrawal in human subjects. *Alcoholism, Clinical and Experimental Research*, 37(3), 484–489. <http://dx.doi.org/10.1111/j.1530-0277.2012.01958.x>
- Pfundmair, M., Aydin, N., Frey, D., & Echterhoff, G. (2014). The interplay of oxytocin and collectivistic orientation shields against negative effects of ostracism. *Journal of Experimental Social Psychology*, 55, 246–251. <http://dx.doi.org/10.1016/j.jesp.2014.07.016>
- Raj, N. S. X. E., & Sim, T. N. (2020). Stressful events, stress level, and psychological distress: A moderated mediation model with secure attachment to God as moderator. *Psychology of Religion and Spirituality*, 1-7. <http://dx.doi.org/10.1037/rel0000388>
- Robinson, E. A., Cranford, J. A., Webb, J. R., & Brower, K. J. (2007). Six-month changes in spirituality, religiousness, and heavy drinking in a treatment-seeking sample. *Journal of Studies on Alcohol and Drugs*, 68(2), 282–290. <http://dx.doi.org/10.15288/jsad.2007.68.282>
- Robinson, E. A., Krentzman, A. R., Webb, J. R., & Brower, K. J. (2011). Six-month changes in spirituality and religiousness in alcoholics predict drinking outcomes at nine months. *Journal of studies on alcohol on drugs*, 72(4), 660-668. <http://dx.doi.org/10.15288/jsad.2011.72.660>
- Rohr, R., & Morrel, M. (2016). *The Divine Dance: The Trinity and the Transformation*. Witaker House.
- Scheele, D., Wille, A., Kendrick, K. M., Stoffel-Wagner, B., Becker, B., Güntürkün, O., Maier, W., & Hurlmann, R. (2013). Oxytocin enhances brain reward system responses in men

viewing the face of their female partner. *PNAS Proceedings of the National Academy of Sciences of the United States of America*, *110*(50), 20308–20313.

<http://dx.doi.org/10.1073/pnas.1314190110>

Schneiderman, I., Zagoory-Sharon, O., Leckman, J. F., & Feldman, R. (2012). Oxytocin during the initial stages of romantic attachment: Relations to couples' interactive reciprocity. *Psychoneuroendocrinology*, *37*(8), 1277–1285.

<http://dx.doi.org/10.1016/j.psyneuen.2011.12.021>

Schneiderman, I., Kanat-Maymon, Y., Zagoory-Sharon, O., & Feldman, R. (2014). Mutual influences between partners' hormones shape conflict dialog and relationship duration at the initiation of romantic love. *Social Neuroscience*, *9*(4), 337–351.

<http://dx.doi.org/10.1080/17470919.2014.893925>

Stauffer, C. S., Musinipally, V., Suen, A., Lynch, K. L., Shapiro, B., & Woolley, J. D. (2016). A two-week pilot study of intranasal oxytocin for cocaine-dependent individuals receiving methadone maintenance treatment for opioid use disorder. *Addiction Research &*

Theory, *24*(6), 490–498. <http://dx.doi.org/10.3109/16066359.2016.1173682>

Strathearn, L., Mertens, C., Mayers, L., Rutherford, H., Rajhans, P., Xu, G., Potenza, M., & Kim, S. (2019). Pathways relating the neurobiology of attachment to drug addiction. *Frontiers in Psychiatry*, *10* (737).

<https://doi.org/10.3389/fpsyt.2019.00737>

Tops, M., Koole, S. L., IJzerman, H., & Buisman-Pijlman, F. T. A. (2014). Why social attachment and oxytocin protect against addiction and stress: Insights from the dynamics between ventral and dorsal corticostriatal systems. *Pharmacology, Biochemistry and*

Behavior, *119*, 39–48. <http://dx.doi.org/10.1016/j.pbb.2013.07.015>

- Tsai, T.-Y., Tseng, H.-H., Chi, M. H., Chang, H. H., Wu, C.-K., Yang, Y. K., & Chen, P. S. (2019). The interaction of oxytocin and social support, loneliness, and cortisol level in major depression. *Clinical Psychopharmacology and Neuroscience*, *17*(4), 487–494. <http://dx.doi.org/10.9758/cpn.2019.17.4.487>
- Ulmer, J. T., Desmond, S. A., Jang, S. J., & Johnson, B. R. (2012). Religious involvement and dynamics of marijuana use: Initiation, persistence, and desistence. *Deviant Behavior*, *33*(6), 448–468. <http://dx.doi.org/10.1080/01639625.2011.636653>
- Van Cappellen, P., Way, B. M., Isgett, S. F., & Fredrickson, B. L. (2016). Effects of oxytocin administration on spirituality and emotional responses to meditation. *Social and Affective Neuroscience*, *11*(10), 1579–87. <http://dx.doi.org/10.1093/scan/nsw078>
- Watson, N. V., & Breddlove, S. M. (2019). *The mind's machine: Foundations of brain and behavior*. Oxford University Press.
- Yirmiya, K., Motsan, S., Zagoory-Sharon, O., & Feldman, R. (2020). Human attachment triggers different social buffering mechanisms under high and low early life stress rearing. *International Journal of Psychophysiology*, *152*, 72–80. <http://dx.doi.org/10.1016/j.ijpsycho.2020.04.001>
- Zak, P., Kurzban, R., & Matzner, W. (2005). Oxytocin is associated with human trustworthiness. *Horm. Behav.* *48*(5), 522-527. <http://dx.doi.org/10.1016/j.yhbeh.2005.07.009>