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Gaining an Upper Hand: How Gesture Usage During Conflict Resolution Predicts Family Cohesion During the Transition to College

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Gaining an Upper Hand: How Gesture Usage During Conflict Resolution Predicts Family Cohesion During the Transition to College

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Dedication

This thesis project is dedicated to Bekah Chan, who told me I should become a psychiatrist when I was twelve, and to Sara Chan, who told me not to settle for mediocrity when I was fifteen.

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Abstract

The purpose of this project is to examine the frequency of hand gestures used by family triads (mother, father, and emerging adult offspring) engaging in a conflict resolution task. The hypotheses explored in this thesis expand upon previous research by Chu, Meyer, Foulkes, & Kita (2014), which suggested that the frequency of gestures individuals use may be related to their own desire to communicate clearly, while also functioning as a way to ensure that the listener understands the information they are conveying. In addition, the usage of gestures conveys to all parties the level of attention each participant has invested into the conversation. Evidence also seems to suggest that gestures are largely produced for the benefit of the listener, thus rendering gestures as a nonverbal demonstration of empathy on behalf of the speaker. In this way, hand gestures may play an important communicative role during conflict resolution. Hand gestures and other nonverbal communication may also provide a sense of validation and support between individuals, even if they do not agree. In addition, hand gestures are especially present during hostile interactions, when the users feel the need to defend and validate their own opinions. The researchers of this project hypothesize that high gestures usage may either be an indication of an especially cohesive family environment, or an especially hostile environment.

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Introduction

Gestures facilitate communication (Chu et al., 2014). Communicative hand gestures have been observed across cultures (Urakami, 2014), age groups (Esteve-Gilbert, Prieto, & Liszkowski, 2017; Cohen & Borsoi, 1996; Chu et al., 2014), and time (Armstrong, 2008; Corballis, 2012; Kendon, 2004). The earliest records of primate behavior suggest that gestures have played a role in communication since the beginning of human history (Armstrong, 2008; Corballis, 2010). However, spoken language has evolved over millions of years to such a high level of sophistication that visual cues are rarely necessary in order for humans to communicate clearly. Psychologists and anthropologists alike have accounted for the lingering prevalence of gestures in modern human interaction by suggesting that they now serve a secondary purpose: to visually demonstrate a desire to communicate more effectively (Chu et al., 2014; Jacobs & Garnham, 2007).

Gesture usage while communicating typically has one of two purposes: allowing the speaker to visually organize their thoughts, or providing the listener with visual information to galvanize their understanding of the subject matter (Jacobs & Garnham, 2007; Chu et al., 2014). As such, gestures demonstrate either the mental process of organizing information while communicating (a gesture for the benefit of the speaker), or a desire to transfer information with higher clarity (a gesture for the benefit of the listener) (Cook & Tanenhaus, 2009; Jacobs & Garnham, 2007; Chu et al., 2014).

Effective communication has played a crucial role in human species' ability to both survive and thrive (Armstrong, 2008; Corballis, 2010). While the means and challenges of survival have evolved since the days of the early primates, the importance of clear

communication has endured as a primary concern for humans and their happiness and wellbeing (Margolin & Wampold, 1981; Jiménez, 2008).

The family triad (two caregivers and a child) provides an especially multifaceted sample for studying communication (Kitzmann, 2000; Lindahl & Malik, 2011). Studies on present-day family cohesion provide researchers with the opportunity to observe participants not only as individuals, but within the context of their relationships with their family members. Since the behavior of an individual can significantly change based on social environment, the family unit has been of particular interest to behaviorists, especially in the area of negative habits and patterns that have been learned within the family system (Cox & Brooks-Gunn, 1999). As such, studying a family unit as family members interact together allows researchers not only to understand the family dynamic, but also to grasp an even more thorough picture of the individuals within the family system (Cox & Brooks-Gunn, 1999).

This concept, as it has been thoroughly explored through Bowen's Family Systems Theory (Coe, Davis & Sturge-Apple, 2018), takes into consideration the presence of imbalance in the family triad, where some family members are more invested in making an effort to communicate more effectively than others (Lindahl & Malik, 2011; Kitzmann, 2000). The ability of a family to communicate together in a healthy, positive way is primarily determined by the level of cohesion within the family (McGuigan, Vuchinich, & Tang, 2014). Family cohesion has been shown to be a strong predictor of not only the health and well-adjustment of the entire family unit, but also of the individuals within the family (McGuigan et al., 2014), and is demonstrated through the nature of their communication, the strength of their bonds, and the degree of independence of the individual family members (Miller & Tucker, 1993).

Family members demonstrate their level of cohesion amongst each other and their perceptions of their own place in the family through both verbal and non-verbal communication (McGuigan et al., 2014). Hand gestures, being one of the more easily visible forms of nonverbal communication (as opposed to facial expressions, body language/posture, and eye gaze), provide insight into the gesturer's thoughts and desires to communicate effectively (Chu et al., 2014). As such, it is possible that hand gestures can provide a visual representation of family cohesion.

The transition to college provides an interesting context to observing family systems. The stress on the family due to a child leaving the family unit can vary both at an individual level, and at a family level (Cowan et al. 2005). Each member of the unit may experience this transition differently, and the stress and anticipation of the upcoming severance heightens the high or low level of cohesion within the family: the bonds between family members with low cohesion may become weaker, and those between family members with high cohesion may become stronger (Moreira & Telzer, 2015; McGuigan et al., 2014).

It is during states of heightened emotion such as these that clear, effective communication may become even more vital to the health of the family unit as they navigate new, previously unexplored areas that cause stress on both the individuals and the family system. Families who have already set patterns for healthy communication may demonstrate such patterns during this time, and families who have a history of unhealthy communication may fall back onto these habits (Kitzmann, 2000). It is possible that through studying these families' gesture usage, an even clearer picture of their cohesion and efforts to navigate these stressors may emerge.

Literature Review

History of Gesture

There is anthropological, neurological, and sociological evidence to suggest that gestures were the earliest method of communication used by hominins (Corballis, 2010). When these prehistoric humans evolved to walk on two legs instead of four, the vocal tract still had not developed enough to produce speech (Armstrong, 2008). The hands and arms, however, were able to move freely and deliberately, allowing primates to communicate through pantomime and imitative gestures (Corballis, 2012). The gap of time between the first appearance of hand and arm flexibility (seen in *Homo erectus)* and the development of the modern vocal tract (seen first in *Homo sapien)* spans nearly 2 million years (Corballis, 2010)**.** Anthropologists have speculated that hand gestures may have been the main form of communication used by the early humans during this time period.

Even today, gesture usage is one of the primary methods of communication used by primates such as chimpanzees, bonobos, and gorillas (Corballis, 2010)**.** Researchers attempting to teach modern primates how to communicate through sign language have been far more successful than those attempting to teach communication through spoken language (Armstrong, 2008; Corballis, 2010).

This ability is partially the result of mirror neurons, the system of activity in the brain that allows a primate to observe the manual actions of another, and then attempt to complete the same motion. The location of the brain where this activity takes place is similar to that of the Broca's area in modern humans: the area of the brain associated with human speech, as well as "motor functions unrelated to speech, including complex hand movements, and sensorimotor learning and integration" (Corballis, 2010, p. 4). Although it is difficult to prove definitively how hominins communicated, there is compelling evidence that gestures played a major role.

Ancient fossils and primate studies are not the only evidence to suggest that gestures have played an important role in the history of communication. Some of the earliest surviving written literature has also discussed the value of using gestures as a means of enhancing communication. From the Greek philosopher Aristotle, who believed gestures distracted from the power of the spoken word, to the Roman politician Cicero, who suggested that gestures were useful for expressing emotion and communication as a whole (Hall, 2004), gestures have long been part of the discussion on human discourse, and as a result, the discussion on the communication of human emotion (Kendon, 2004). In first century CE, Spanish rhetorician Quintilianus wrote one of the most thorough early treatises on gesture usage in rhetoric: *Institutio oratoria.* His argument that hand gestures either function to express thoughts and emotions, or to mimic certain actions still holds true in the literature today (Kendon, 2004; Hall, 2004).

In more recent centuries, historians have sought to understand the evolution of gesture usage throughout time periods, and its concentrated usage in specific locations. In 1832, Italian historian Andrea de Jorio published his controversial commentary on hand gesture usage in Naples. This work, later translated by Adam Kendon, attempted to defend the prevalence of gestures amongst Southern Europeans by comparing the intricacy and precision of their gestures to those used in classical Ancient Greek artworks (Jorio & Kendon, 2000). Kendon went on to describe Naples as a bustling metropolis where people speaking many different languages were required to communicate effectively in noisy settings (Acocella, 2002), a spectacle that shocked tourists and foreigners who, upon their return home, would share stories of the "gesturing Italians". Despite de Jorio's best efforts to romanticize this phenomenon, the stereotype that Italians gesture to almost a comical extent would prevail well into the 20th century (Graham & Argyle, 1975).

Gesture and psychology

While recent studies on hand gestures still regularly fall into the area of linguistics, additional areas such as archeology and psychology have developed interest in gestures. However, the field of psychology has not always embraced the study of hand gestures. Early 20th century psychoanalysts considered gestures to be too deliberate and controlled to be motivated by the unconscious mind (Kendon, 2004), narrowing its importance to that of sign language.

However, beginning in the 1940s, the development of audio-visual recording technology made it possible for researchers to observe nonverbal aspects of human behavior more closely (Kendon, 2004). Psychologists began to realize that body language, including gestures, indicated valuable information about human thought, as well as human interaction, reaction, and mutual understanding (Kendon, 2004). This attitude still guides psychology-based hand gesture research today.

Why gesture is important to study

Hand gestures play a vital role in both individual and group communication and engagement. Researchers have observed that gestures can disclose thoughts and emotions that are not relayed by spoken words (Novack & Goldin-Meadow, 2015; Cook & Tanenhaus, 2009), convey information that is different than spoken communication (Novack & Goldin-Meadow, 2015), and provide information that enhances both the listener's and speaker’s comprehension of the spoken communication (Maricchiolo, Gnisci, Cerasuolo, Ficca, & Bonaiuto, 2016).

In addition, gestures convey to all parties the level of attention each participant has invested in the conversation (Kendon, 2004). Body language and orientation play a significant role in how individuals communicate information to each other (Kendon, 2004). Not only are

gestures an important indication of a speaker's engagement in the conversation, but they are also a visible signal of the speaker's support of the listener (Chu et al., 2014). In this way, the presence of gestures during an interaction can function as a nonverbal assessment of each individual's investment in the conversation, as well as the group's collective understanding of what is being communicated.

Gesture usage

Psychologist and linguist David McNeill proposed that "gestures share a computational stage with speech" (Jacobs & Garnham, 2007, p. 291). Gestures primarily serve one of two purposes: To aid the speaker's production of speech, and to provide the listener with additional information to increase their understanding of the subject matter (Jacobs & Garnham, 2007). In addition, the level of understanding that the listener has of the material being discussed also has an impact on whether or not the speaker produces gestures (Jacobs & Garnham, 2007).

Gestures may also assist speakers with speech production (Jacobs & Garnham, 2007). Representational gestures, which depict concrete or abstract concepts, are especially thought to be linked with the hypothesis that gestures help the speaker to organize their ideas into manageable thoughts suitable for spoken communication (Kita, 2000). This theory is supported by the fact that speakers still produce gestures even when a listener is not able to see the speaker (Jacobs & Garnham, 2007), as well as the phenomenon that individuals who have been blind since birth have also been observed using gestures (Kendon, 2004). These studies strongly suggest that, while gestures serve an interactive role with the listener, they also play an assistive role for the speaker.

However, despite this evidence that gestures may benefit the speaker in their thought and speech process, an overwhelming majority of the research supports the idea that gestures are

largely produced as a result of the speaker's desire to communicate clearly with the listener, creating a "dual pathway model in which gestures enhance the content" (Jacobs & Garnham, 2007, p. 293). Gestures have consistently been shown to benefit communication, and many studies have speculated as to what populations benefit most from gesture usage (e.g. young children, older women, etc.), and how gesture execution and different types of gestures may affect communication (Hostetter, 2011).

Different types of gestures

Because hand gestures are studied in multiple fields, there are several different systems for classifying hand gestures. Researchers studying the biological bases of deliberate hand gestures might categorize them using Nespoulous' gestural typologies (Nespoulous, Perron, & Lecours, 2014); electronic engineers teaching hand gestures to AI robots may use the Gesture Alphabet (Trigo & Pellegrino, 2010). Neurologists studying the effect of gestures on word retrieval may use the Krauss Autonomous Model (Krauss, 1998), and linguists studying how gestures correspond with semantic information in speech may use the McNeill Integrated Model (McNeill, 1985) or de Ruiter's Sketch Model (de Ruiter & de Beer, 2013). The ideal lens through which to view gestures depends on the type of information that researchers hope to gain.

Humans primarily utilize gestures in two scenarios: in a public speaking setting, and in a conversational setting. Gesturing within a conversational setting provides some limitations. Whereas public speakers have free rein to convey their ideas without, typically, the threat of interruption, individuals engaging in conversation must communicate in a way that does not jeopardize their legitimacy as a member of the discussion. While public speakers may gesture constantly throughout their speeches, there is no need to mediate the flow of speech, either to continue it or stop it. Public speakers have a set course from beginning to end, whereas

conversers must navigate the reaction and feedback to their speech. In this way, conversational hand gestures play not only a role in conveying information, but also in keeping all members of the conversation engaged (Jacobs & Garnham, 2007).

Conversational gestures have been described by McNeill as "movements of the hand that co-occur with speech but do not appear to be consciously produced by the speaker" (Jacobs & Garnham, 2007, p. 291)**.** Conscious hand movements, such as sign language, and non-communicative gestures, such as fidgeting, do not fall into this category. In addition, while conversational hand gestures may be present in non-conversational settings, their significance as interactive devices is unique to conversation.

One of the more recent systems of categorizing hand gestures, created by Chu et al. (2014), sorts conversational gestures into three main categories: representational, conduit, and palm-revealing. A majority of the current research on gestures focuses on representational gestures (Kita, Alibali, & Chu, 2017), which primarily clarify the content of the speaker's speech by depicting "concrete or abstract concept[s] with the shape and motion of the hands" (Chu et al, 2014, p. 695). Representational gestures are directly linked to the subject matter, and function as a means to providing the listener with even more information about the subject, thus conveying the speaker's desire to be clearly understood. Representational gestures themselves can be broken down even further into different categories, such as iconic gestures (pantomimes), metaphoric gestures, and deictic gestures (McNeill, 1992; Kita et al., 2017).

Conduit gestures are specific in terms of hand shape and motion. These gestures are categorized as movements when "the palm of the hand faces upward and moves toward the listener as if to present a clearly formulated idea" (Chu et al., 2014, p. 695). Conduit gestures differ from representational gestures because they function as an invitation for the listener to

participate in the conversation. They also have an emotional aspect, as they function as a way to ensure that the listener is engaged, as if to say, *what do you think?*.

Palm-revealing gestures require an open palm displayed to the listener "as if to indicate uncertainty or having nothing to say by showing an empty hand" (Chu et al, 2014, p. 695). These gestures indicate an end to the speaker's verbal communication or train of thought, and may be taken as an invitation for the listener to speak, or the speaker's desire for the end of the conversation. While the motion is similar to that of conduit, it is decidedly more stiff, and is typically accompanied with a harder tone of voice, and a shrug of the shoulders.

Although beat gestures were mentioned by Chu et al's research team (2014), they were not classified as significant to their study, primarily because they neither depict any semantic content, nor play any interactive role within the conversation. However, beat gestures do function to assist the speaker with speaking, or to punctuate certain words within the speech. In this way, beat gestures may indicate frustration on behalf of the speaker, or a desire to make a point especially clear through the words only, without adding any additional information via the hand.

Other gestures include unfinished gestures and conscious gestures, such as those mentioned earlier, as well as any other motions with the hand that cannot be included in any of these four categories.

Gestures and Diversity

Gestures have been observed across all populations, regardless of culture, age group, and gender (Urakami, 2014; Esteve-Gilbert et al., 2017; Cohen & Borsoi, 1996; Chu et al., 2014; Jospe, Flöel, & Lavidor, 2017). However, several studies have sought to uncover whether gestures are more prevalent in some populations as opposed to others.

Age. Differences in gesture usage have been observed in older and younger women. When the gesture usage of senior citizen women was compared to the gesture usage of undergraduate women (all participants were white Caucasians), researchers found that the younger women produced more descriptive (representational) gestures, but both groups were observed making non-descriptive gestures equally (Cohen & Borsoi, 1996; Chu et al., 2014.

Age and gender are both important factors in the deciphering of how gesture usage is developed. Although both boys and girls have been observed making their earliest attempts at communication through gesture instead of speech, researchers have found that boys on average use gestures to accompany speech 3 months later than girls (Özçalışkan & Goldin-Meadow, 2010). This finding follows a similar trajectory as verbal language development, which researchers have attempted to explain with the theory that girls understand the "semantic relations between objects and⁄or actions" (Özçalışkan & Goldin-Meadow, 2010, p. 758) before boys, and the finding that boys tend to perform better than girls at gross motor skills, while girls outperform boys in fine motor skills. This difference in gender is evident even in the earliest days of infancy, where studies on 1 to 3-day-year-old infants showed that newborn girls were better at imitating fine motor finger extensions than newborn boys (Özçalışkan & Goldin-Meadow, 2010).

Technology has had a profound effect on human communication, especially adolescents (Boniel-Nissim et. al, 2015). While gesture usage has not been studied in tandem with the rise of virtual communication, studies have found that adolescents who participate in electronic media communication (EMC) are more comfortable when talking with friends and those of the opposite sex (Boniel-Nissim et. al, 2015), and adolescents often use EMC more than offline communication with their friends (Gomez-Baya, Rubio-Gonzalez, & Gaspar de Matos, 2018). In

past studies regarding developmental psychology and technology, researchers have looked to television's effect on adolescents, utilizing an "effects model" that measured viewership against certain behaviors, such as aggression (Greenfield & Yan, 2006). However, since the internet and instant communication devices require active rather than passive participation, some psychologists have warned against considering the internet and EMC as an external effect, but rather a culture (Greenfield & Yan, 2006). This new, but widespread variable must be taken into account with any recent study on young adults and human communication.

Conversely, age has been shown to have an effect on the ability to correctly identify the verbal and nonverbal social cues of others. Older adults (age 65-89) make more errors in accurately identifying emotional body cues and gestures compared to college students (age 18-22) (Montepare, Koff, Zaitchik, & Albert, 1999), and older adults are less adept at decoding nonverbal and inexplicit social cues, such as sarcasm, facial expressions, and body language (Phillips, Allen, Bull, Hering, Kliegel, & Channon, 2015). However, while a recent study with younger and older adults found that there was no age effect on the number of gestures produced, the types of gestures used varied by age, with older adults using gestures more during a word retrieval task, and younger adults gesturing more when completing a narrative task (Theocharopoulou, Cocks, Pring, & Dipper, 2015). Therefore, it is possible that both young and older adults equally experience unique roadblocks that hamper clear in-person communication.

Gender. Although some studies have found that gender produces no significant differences in gesture production in adults (Jospe et al., 2017), other studies have found differences in both qualitative and quantitative aspects of gestures between genders (Saucier & Elias, 2001; Briton & Hall, 1995). Researchers have found that men make more "free movements" with their right hands while speaking, and more "self-touching movements with the

left hand" while listening (Saucier & Elias, 2001, p. 244). Neither of these findings were present in the women observed. It is possible that these differences are evidence of a "sex difference in hemispheric specialisation" (Saucier, Elias, 2001), but researchers have been hesitant to conclude this indicates a gender difference in hemispheric lateralisation.

Studies have found that women overall produce more hand gestures than men (Chu et al., 2014; Hostetter & Hopkins, 2002). However, women produced lexical movements (gestures that assist with speech production, i.e. representational and beat gestures) at a similar rate to men (Hostetter & Hopkins, 2002), suggesting that men and women use gestures to aid with speech production equally, refuting earlier claims in the literature that women gestured more than men because they had greater difficulty accessing lexical information (Hostetter & Hopkins, 2002). Another complication in this area is that women are rated as less competent when they are emotionally expressive versus when they show no emotion, as opposed to their male counterparts, who are rated similarly regardless of emotion expressed, with the exception of sadness (Lewis, 2000). A recent study with male and female attorneys found that, even when given an identical closing argument script and instructions to use similar tones of voice and hand gestures, the men's expression of emotion (including gestures) was justified, but women's was not (Salerno, Phalen, Reyes, & Schweitzer, 2018). As such, the cultural acceptance of gestures and expressions of emotion with regards to gender must be taken into consideration when studying gesture usage.

Culture. Communication is greatly impacted by culture. Differences in gesture usage have been found in cultures that share the same continent (Italian speakers gesture more often than British English speakers (Chu et al., 2014)), and cultures from different continents (Taiwanese mothers gestured three times as often as North American mothers (Goldin-Meadow

& Saltzman, 2000)). However, it would be misleading to simply organize the world's cultures by how frequently or infrequently on average its people gesture; the reasons why speakers produce gestures, and the ways they are received by listeners is part of the larger context of cultural communication.

For over a hundred years, cultural studies have established collectivism and individualism as two of the primary cultural worldviews (Takano & Osaka, 1999). Collectivism, a cultural outlook where the benefits of the group (family, society, country) are generally considered more important than the benefits of the individual, has been made synonymous with "Eastern cultures" such as China, Japan, and Korea, but it is also considered to be prevalent in African, Middle Eastern, and Latin American cultures (Vignoles et. al, 2016). Individualism, a cultural outlook where the benefits to the individual are considered more important, has been linked to European cultures, and countries with large numbers of European immigrants, such as North America, Australia, and Canada (Urakami, 2014).

For decades, these distinctions influenced research on cultural differences in human behavior and communication, leading to studies that compared samples from countries that were believed to be highly collectivist against those thought to be highly individualistic. It was believed that because collectivist culture is more focused on building relationships, individuals in this culture would use more indirect communicative techniques, with greater care taken to whether or not the listener understands the message (Urakami, 2014). In addition, the collectivist attitude could also be demonstrated through the use of more sequential gestures, and fewer gestures that directly made contact with physical surfaces such as a tabletop, with speakers preferring instead to gesture above the table (Urakami, 2014). In a study comparing Japanese speakers to German speakers, the Japanese participants were more likely to take an

interdependent perspective when gesturing, using the table to indicate a third person's point of view rather than using themselves as a reference point (Urakami, 2014). In contrast, German speakers tended to touch the table more frequently when gesturing, and demonstrated a "self-centered" perspective [by] using their own body as [a] reference point for the gesture" (p. 188). This style of communication is indicative of individualism and its focus on clear and direct information exchanges.

However, an increasing number of studies have called for a more multi-dimensional look into culture, believing that the East-West/collectivist-individualist dichotomy is grossly oversimplified (Phalet & Schönpflug, 2001; Takano & Osaka, 1999; Vignoles et al., 2016). While the ideas of individualism and collectivism are still valid as one aspect of culture, researchers have argued that taking variables such as religion, socio-economic status, voluntary settlement, climato-economic interactions, parenting styles, and general health into consideration is necessary to any thorough conversation on culture (Vignoles et al., 2016; Phalet & Schönpflug, 2001).

A recent study that surveyed 55 cultural groups across 33 nations found that samples with Catholic heritages, as well as those from more developed nations, scored higher on self-expression (Vignoles et al., 2016). However, the researchers cautioned against assuming that higher personal wealth resulted in a shift from collectivism to individualism; instead, samples seemed to equally demonstrate independence and interdependence, but as socio-economic status shifted, so did the ways that these cultural aspects were expressed (e.g. interdependence being expressed through dependence on others vs. commitment to others). While it would be easy to conclude that individuals from certain ethnic cultures, religious backgrounds, or socio-economic status are more liable to outwardly express themselves and thus use hand gestures more,

researchers have advised against such thinking, suggesting instead that culture be analyzed through a much greater multidimensional model in order to avoid perpetuating any stereotypes, and to convey as accurate information as possible (Phalet & Schönpflug, 2001; Takano & Osaka, 1999; Vignoles et al., 2016). The previously mentioned commentary on the perception of gestures in Italian culture is a prime example of how multiple factors, including trade, population, and perhaps most importantly, the proliferation of stereotypes can have a profound effect on how gestures and culture interact.

Family Cohesion

Family environment provides an in-depth look at society, community, and culture, as well as context for the family's individual communicative preferences, problem-solving techniques, and strategies for behavior correction (McGuigan et al., 2014). Family cohesion, "the affective bonds between family members" (McGuigan et al., 2014, p. 97), measures the closeness of the family unit, and is a general predictor of healthy communication (McGuigan et al., 2014). Individuals learn how to communicate and resolve (or ignore) conflicts in their family environment, both from their parents' conflict resolution styles, and from general conflict resolution within the family (Kitzmann, 2000).

While conflict is typically seen as damaging to relationships, it has the potential to be a positive factor in family development (Cox, 1999). When conflict is present in the family, the effect it has on the cohesion of the family is dependent on how they address and resolve the conflict. If resolved in a healthy manner, conflict can actually strengthen the family bonds; if conflict is ignored or resolved in an unhealthy way, it can destroy those bonds and weaken family alliances (McGuigan et al., 2014; Cummings & Wilson, 1999). Furthermore, within a family unit, it is possible for conflict to exist in-between some parties, but not others (e.g.

between a mother and father, but not between parents and children, or between siblings, but not between parents). Children who observe healthy conflict resolution tend to be more emotionally stable than those who observe no conflict at all (Cummings & Wilson, 1999). The presence of marital conflict also does not necessarily affect family cohesion as a whole, as long as it is made clear that the family unit and its togetherness are not at risk. (Lindahl & Malik, 2011).

Gottman Conflict Resolution Task. The cross-section between family conflict and communication patterns has been studied for decades by John Gottman, one of the most prolific researchers in marriage and family psychology (Gottman, Markman & Notarius, 1977; Gottman, 1980; Gottman & Porterfield, 1981). In the late 1970s, Gottman produced several papers on marital conflict resolution and nonverbal communication. His primary method of observation in these studies was through a series of experiments where distressed and non-distressed couples would select an area of conflict within their marriage, and then attempt to come to a resolution within ten minutes. These interactions would be videotaped and then studied extensively in areas such as nonverbal behavior, voice cues, and word content, amongst other things (Gottman et al., 1977).

This setup proved successful for several reasons. Gottman and his colleagues believed that having the couples discuss a conflict that had real-life implications was more impactful and meaningful than having couples participate in roleplaying or some alternative task manufactured by the researchers (Gottman et al., 1977). The fact that the couple was working through an actual area of conflict in their relationship contributed to the realism of the task and the emotions expressed. In addition, by videorecording the task and leaving the couple alone for the allotted ten minutes, Gottman found consistency in how the couples interacted in the laboratory to how they acted while in their private homes (Gottman, 1979). Follow-up studies using this task

protocol also found significant results linking communication styles to marital distress, as well as indications that women and men demonstrated different strategies and behaviors during the task (Margolin & Wampold, 1981). Studies specifically looking at nonverbal communication found that marital satisfaction played a significant factor in husbands being able to read their wives nonverbal cues (but not for wives being able to read their husbands) (Gottman & Porterfield, 1981). Studies also found evidence that nonverbal behavior was static with distressed couples, even when they were asked to act "happy", suggesting that nonverbal behavior provides "the only basis for distinguishing between distressed and nondistressed couples" (Gottman & Porterfield, 1981, p. 818).

Dyads vs. Triads. Multiple studies have explored gender differences in communicative behaviors in heterosexual couples. The stereotype that women talk more than men (Leaper & Smith, 2004) has been supported by several publications, including a study that found that mothers talk more than fathers (Leaper, Anderson, & Sanders, 1998), and girls are "more likely than boys to use language to make connections with others" (Leaper & Smith, 2004, p. 994). In conflict resolution tasks, women were more emotionally expressive, and men relied more on presenting factual information (Margolin & Wampold, 1981).

Even in family settings, mothers were generally found to talk the most. Studies of family triads found that mothers talked more to daughters than to sons (Leaper et al.,1998). Studies on dinnertime conversations found that mothers also talked the most, especially when the topic of discussion was about behavior (Merrill, Gallo, & Fivush, 2015), but mothers and fathers talked equally when general topics were discussed. In addition, children of both genders disclosed that they talked to their mothers more than their fathers (Jiménez, 2008), and mothers were the preferred parent to consult for emotional support (Paterson, Field, & Pryor, 1994).

Behaviors in triads have significantly more interactions at play than with dyads. In studies of family triad interactions, researchers have observed that the "presence of the father enhanced the quality of mother–son relations, whereas the presence of the mother reduced the quality of father–son relations" (Gjerde, 1986, p. 297). However, in a dyadic setting, fathers were more responsive to their sons, whereas in a triadic setting, fathers were more withdrawn (Gjerde, 1986). Mothers were more openly emotional in triads with sons than with daughters (Lindsey & Caldera, 2006). Mothers also used more supportive speech, while fathers used more directive speech with both daughters and sons, although women talked less and were less openly supportive when the child was a son (Leaper et al.,1998). In addition, fathers in triads were less involved, but more emotional than mothers (Lindsey & Caldera, 2006).

Transition to college. The transition to college is a stressful time for both parents and the student (Rogers et al., 2018). During this time period, parents have considerable influence in their child's life (Small, Morgan, Abar, Maggs, 2011), with parenting styles having direct impact on the student's health, well-being, and adjustment (Greene, Jewell, Fuentes, & Smith, 2019). A secure parent/child relationship can mediate some of the negative effects during this transition (Rogers et al., 2018; Greene et al., 2019; Hiester, Nordstrom & Swenson, 2009). New college students in strong relationships with their parents have benefited socially, including positive correlations with "ease in forming friendships" (Parade, Leerkes, & Blankson, 2010), safe drinking behaviors (Small et al., 2011), practicing safe sex (Fisher, 1987), and lower social anxiety for minority students (Parade et al., 2010).

Healthy, supportive parent-child relationships also have a positive impact on students' personal growth, with high student satisfaction with at least one parental relationship being associated with reduced worries and lower achievement guilt (Greene et al., 2019), higher

autonomy (Greene et al., 2019; Hiester et al., 2009), and decreased loneliness (Larose & Boivin, 1998). Conversely, higher levels of family conflict and unhealthy attachment have predicted higher “negative affect experiences”, diminished ability to adapt at college, increased conflict with romantic partners (Rogers et al., 2018), and increased worries and higher achievement guilt (Greene et al., 2019).

Study Hypotheses

This study was designed to gain a greater understanding of how hand gestures are utilized within family conflict resolution. Because there is a lack of studies specific to hand gestures and family cohesion, this study is looking specifically at how different types of hand gestures are utilized in families of low and high cohesion. In addition, the self-reported presence of low and high conflict within the family unit will also be taken into consideration.

In an effort to derive as accurate and clear results as possible, this study proposes two hypotheses. Since gestures are a visible signal of an effort to be understood clearly (Jacobs & Garnham, 2007), I propose that family members who report that their family unit is highly cohesive will use more hand gestures in order to ensure that their family communication is in a continual state of understanding. I also propose that these families will show more representational hand gestures, stemming from a desire to make their own concepts clearly understood by the listeners, rather than a need to emotionally validate themselves or each other.

Conversely, I propose that family members who believe their family unit is not cohesive will also use more hand gestures because they believe their words are not an adequate method of being clearly understood. I propose that family units who believe they are not cohesive will use more conduit and palm-revealing gestures, demonstrating a desire to clearly demonstrate the emotional weight attached to the lack of cohesion, and a need for self-validation.

Method

Three cohorts of a total of 101 first-year undergraduate students (37 male, 64 female) at West Chester University (WCU) participated in the Coping with the Transition to College study (Gans & Johnson, 2016). After accepting admission to the university, new college students were contacted by mail requesting that they participate in a project studying new students' adjustment to the first year of college. Inclusion criteria required student participants to be between the ages of 17 and 19, to be starting college for the first time, and to have two caregivers who also agreed to participate in the study. In an effort to obtain some homogeneity in the definition of family among our sample, we defined caregivers as two adults with whom the new student participant has been living for the last 5 years prior to starting college. Mean age of student participants was 17.85 years (SD = 0.45 years), 89% self-identified as Caucasian, 5% self-identified as African American, 5% self-identified as multi-racial, and 1% self-identified as Latina/o. Mean age of mothers was 49.05 years (SD = 4.35 years) and mean age of fathers was 51 years (SD = 5.14 years). Attrition between initial study participation (pre-college assessment) and the final follow-up assessment (spring semester) resulted in complete data for 77 student participants (25 male, 52 female). There were no significant differences in pre-college study variables (family cohesion, family conflict) for participants based on study completion.

Of the 101 families who participated in this study, only 84 families had usable data for this particular thesis. These 17 families had to be removed for reasons such as "hands not visible" "dialogue inaudible" "disk unreadable" or "disk damaged". Of the remaining 84 families, 33 had sons, and 51 had daughters, and all families had both one father and one mother parental figure present.

Procedure

EA participants came to the Whole Family Biopsychology laboratory at WCU for three assessment appointments over the course of their first year in college: (1) Pre-College Assessment (during the summer prior to beginning college), (2) Fall Semester Assessment, (3) Spring Semester Assessment. In order to facilitate parent's participation in the study and participation of students who live outside of the local area (1.5% of first-year university students), participants were given the option of scheduling the pre-college assessment on the same day as new student orientation (a university event that parents are encouraged to attend). The pre-college assessment took place in the afternoon and was approximately 90 minutes in length. Fall semester and spring semester assessments were each approximately 60 minutes long.

Pre-college assessment

Parents accompanied their EA child to the pre-college assessment visit. After providing consent for study participation, family participants completed a series of questionnaires assessing their perceptions of their family environment and individual behavioral adjustment. Family members were then escorted into a separate room where they were instructed to build a house of cards together using as many cards as possible. Three decks of cards and a tablecloth were provided in a clear plastic container. Even with the tablecloth, this was a virtually impossible task that was not amenable to control by participants. Families were aware of (and had consented to) the video recording of the family interaction task. After completing the house of cards family interaction task, participants returned to the laboratory waiting room to complete their questionnaire packets. Family members then returned to the observation room where they were video-recorded for a second family interaction session (family conflict task).

At the start of the family conflict task, a research assistant reviewed one of the questionnaires completed by all family participants identifying areas of conflict within the family, noting an area that all family members endorsed. The research assistant shared this finding with the family and then instructed each family member to make a brief statement about their perception of the problem without interruption from others in the family. When all three family participants had shared their statements, a timer was set for 2 minutes and participants were instructed to sit silently thinking about their problem until the timer rang, and told that at that time they should take the remaining 15 minutes to discuss the problem and work toward some type of resolution. Participant families were reimbursed $75 ($25 per family member) for their time engaging in the pre-college assessment.

Fall and spring semester assessments

Student participants returned for a second assessment session during the Fall semester and a third assessment session during the Spring semester of their first college year. During these follow-up assessment sessions, students completed a series of self-report instruments assessing their perceptions of their family environment and their behavioral adjustment. Participants were reimbursed $25 for the time they spent engaging in study activities for each follow-up assessment ($50 total). To reduce attrition, we used e-mail and phone reminders about assessment appointments during the semester between follow-up sessions. Follow-up assessment sessions were scheduled for the middle of the Fall and Spring semesters in order to give students time to adjust to the new semester and to avoid assessing participants during the last 3 weeks of the semester when academic stress is often high.

Data for the present study comes from mothers' and fathers' assessment of the family environment during the pre-college assessment, EA participants' assessment of the family

environment during the pre-college, fall, and spring assessments, and from the family conflict interaction session.

Measures

Self-perceived family relatedness

The Family Environment Scale (FES; Moos & Moos, 2009) measures participants' perceptions of their family environment by asking participants to respond to statements about their family as true or false. Emerging adult participants completed the FES during the Pre-College and Fall semester assessment points during the college transition. Responses are added to create ten 9-item sub-scales divided among three dimensions (Family Relatedness, Personal Growth, and System Maintenance) assessing Cohesion, Expressiveness, Conflict, Independence, Achievement Orientation, Intellectual-Cultural Orientation, Active-Recreational Orientation, Moral-Religious Emphasis, Organization, and Control within the family environment. Only the Family Relatedness dimension comprised of Family Cohesion (i.e., the commitment, help, and support family members provide for one another), Family Expressiveness (i.e., the extent to which family members are encouraged to act openly and to express their feelings directly), and Family Conflict (i.e., open conflict in the family) were used in the present study. Using procedures outlined by Moos & Moos (2009), raw scores for each sub-scale were converted to standard scores.

Gestures. Gestures were coded from the family conflict resolution task. Each video was transcribed beginning after the timer rang, signaling for the family to begin their discussion, and ended once the researcher knocked on the door, informing the participants that their time was over. The gestures were coded based on 4 gesture types: Representational (gestures depicting concrete or abstract concepts), conduit (gestures inviting the listener to participate in the conversation), palm-revealing (gestures signaling the end of the speaker's participation in the conversation), and beat (gestures punctuating certain words, without an interactive function). Conscious hand gestures such as adjusting clothing, scratching, and touching hair, etc. were not

coded. The number of each type of gesture demonstrated was noted for each participant (e.g. FatherR: 4; MotherR: 17; ChildR: 36), as well as total gestures used for each participant (e.g. FatherT: 5; MotherT: 28; ChildT: 45), and total gestures per family (e.g. Family1Total: 78). The frequency of each type of gesture used by all family members was also noted (e.g. Family1TotalR: 57). The number of words spoken was also noted for each participant (e.g. Father: 150; Mother: 694; Child: 1070).

Results

Descriptive Statistics

Types of Gesture Used. Total gestures used during the conflict resolution task ranged from 8-280 (M = 83.02, SD = 49.37). Representational gestures were used the most, with the numbers ranging from 4-240 (M = 58.69, SD = 40.04) per video. Conduit gestures, the second most frequently used gesture, were used from a range of 0-64 times (M = 11.29, SD = 10.97). In-Palm (palm-revealing) gestures were used 0-13 times (M = 3.00, SD = 2.92), and beat gestures were used 0-54 times (M = 9.76, SD = 11.66).

Total gestures used by each party also varied, with mothers consistently using the most gestures, with a range from 0-154 (M = 35.02, SD = 31.39; $F(2,166)=6.83$, $p \leq 0.05$). Fathers and students used gestures at a similar rate, with father range being from 0-112 (M = 25.21, SD = 23.74), and student range being from 0-107 (M = 22.39, SD = 18.59).

Out of these gestures, representational gestures were used by mothers more than any other gestures (range 0-142; M = 24.92.02, SD = 24.67; $F(2,166)=6.18$, $p \leq 0.05$), followed by beat gestures (range 0-49; M = 4.81, SD = 9.30), conduit gestures (range 0-26; M = 4.31, SD = 4.82), and in-palm gestures (range 0-7; M = .86, SD = 1.42). Fathers used representational gestures more than any other gestures (range 0-84; M = 17.31, SD = 17.38), followed by conduit gestures (range 0-19; M = 4.02, SD = 4.52), beat gestures (range 0-38; M = 3.18, SD = 6.63), and in-palm gestures (range 0-5; M = .77, SD = 1.11). Students also used representational gestures more than any other gestures (range 0-92; M = 16.29, SD = 15.05), followed by conduit gestures (range 0-26; M = 2.96, SD = 4.80), beat gestures (range 0-19; M = 1.88, SD = 2.94), and in-palm gestures (range 0-8; M = 1.3, SD = 1.71).

Representational gestures were used by mothers more than any other group (range 0-142; M = 24.92.02, SD = 24.67; $F(2,166)=6.18$, $p \leq 0.05$), while students used conduit gestures far

less than their parents (range 0-26; *M* = 2.96, *SD* = 4.80; F(2,166)=3.16, p ≤ 0.05). Students used in-palm gestures significantly more than their parents (range 0-8; *M* = 1.3, *SD* = 1.71; F(2,166)=3.81, p ≤ 0.05), and beat gestures significantly less than their parents (range 0-19; *M* = 1.88, *SD* = 2.94; F(2,166)=3.87, p ≤ 0.05).

Word Count. The average number of words for each family was 2276.26. Mothers uttered the most words out of all parties (range 230-2042; *M* = 881.75, *SD* = 415.575; F(2,168)=7.72, p ≤ 0.05), and students (range 201-1873; *M* = 723.67, *SD* = 352.76) uttered a similar number of words as fathers (range 58-1673 (*M* = 670.64, *SD* = 297.49). Daughters (*M* = 756.88, *SD* = 366.95) and sons (*M* = 673.85, *SD* = 329.60) uttered words at a comparable rate.

Differences based on student gender. The average number of words uttered by each family was similar regardless of whether the student was a son or daughter (F(3,81)=0.55, p =0.65); the number of gestures used was also similar regardless of the student's gender (F(3,80)=0.75, p = 0.53). When the student was a daughter, mother word count (*M* = 896.63, *SD* = 417.50) was similar when compared to when the student was a son (*M* = 859.44, *SD* = 417.91). Fathers also spoke a similar number of words when the student was a son (*M* = 688.47, *SD* = 273.40) as opposed to when the student was a daughter (*M* = 658.75, *SD* = 314.62).

Students gestured at an almost identical rate, regardless of whether they were a son (*M* = 22.58, *SD* = 16.91) or a daughter (*M* = 22.27, SD = 16.91). Similar to number of words spoken, mothers gestured at a comparable rate when the student was a daughter (*M* = 37.80, *SD* = 31.04) as opposed to a son (*M* = 30.73, *SD* = 31.92), and fathers also gestured similarly regardless if the student was a son (*M* = 28.03, *SD* = 22.77) or a daughter (*M* = 23.39, *SD* = 24.39).

There were few distinctions in types of gestures used when the student was a daughter vs a son. Sons (*M* = 16.39, *SD* = 13.40) used representational gestures at a nearly identical rate to

daughters (*M* = 16.22, *SD* = 16.16). Mothers used representational gestures at a similar rate when the student was a daughter (*M* = 25.98, *SD* = 22.46) as opposed to a son (*M* = 23.37, *SD* = 28.04), and fathers used representational gestures at a comparable rate when the student was a son (*M* = 20.21, *SD* = 18.33) as opposed to a daughter (*M* = 15.43, *SD* = 16.66). Any differences in representational gesture usage were not statistically significant (F(3,80)=0.76, p =0.52).

Similarly, there were no statistically significant differences in conduit gesture usage (F(3,80)=0.04, p = 0.99). Daughters (*M* = 3.10, *SD* = 4.83) used conduit gestures at a similar rate to sons (*M* = 2.76, *SD* = 4.84). Mothers used conduit gestures at a nearly identical rate regardless if the student was a daughter (*M* = 4.33, *SD* = 4.43) as opposed to a son (*M* = 4.27, *SD* = 5.44), and fathers used conduit gestures at a nearly identical rate regardless if the student was a daughter (*M* = 4.04, *SD* = 4.78) or a son (*M* = 4.00, *SD* = 4.22).

No statistically significant differences were found with in-palm gestures (F(3,80)=0.50, p = 0.50), with sons (*M* = 1.45, *SD* = 1.54) using in-palm gestures at a similar rate to daughters (*M* = 1.20, *SD* = 1.82). Mothers used in-palm gestures at a similar rate when the student was a daughter (*M* = 0.94, *SD* = 1.53) as opposed to a son (*M* = 0.73, *SD* = 1.23), and fathers used in-palm gestures a comparable number of times when the student was a son (*M* = 0.88, *SD* = 1.22) as opposed to a daughter (*M* = 0.71, *SD* = 1.05). When the child was a son, fathers (*M* = 0.88, *SD* = 1.22) used in-palm gestures at a similar rate to mothers (*M* = 0.73, *SD* = 1.23), and when the child was a daughter, father (*M* = 0.71, *SD* = 1.05) in-palm gesture usage was similar to mothers (*M* = 0.94, *SD* = 1.53).

Sons (*M* = 2.06, *SD* = 3.75) used beat gestures at a similar rate to daughters (*M* = 1.76, *SD* = 2.31). Mothers used beat gestures significantly more when the student was a daughter (*M* = 6.47, *SD* = 11.323) as opposed to a son (*M* = 2.24, *SD* = 3.60), and fathers used beat gestures at a

similar rate when the student was a daughter (M = 3.24, SD = 7.42) as opposed to a son (M = 3.09, SD = 5.29).

Differences based on Cohort. Data from this study came from three separate cohorts. The conflict resolution task for the first cohort (videos 1-31), ran for 10 minutes, and the families in the second and third cohorts each spent 15 minutes completing the task. Despite the extra time allotted for cohorts 2 and 3, there was no statistically significant difference between the total number of gestures seen in each cohort. Total gestures used by students in Cohort 1 (n = 27; M = 23.52; SD = 14.69) was similar to total gestures used by students in Cohort 2 (n = 38; M = 21.11; SD = 17.47) and Cohort 3 (n = 18; M = 24.28; SD = 25.85). Total gestures used by mothers in Cohort 1 (n = 27; M = 27.33; SD = 23.46) was statistically similar to total gestures used by mothers in Cohort 2 (n = 38; M = 39.32; SD = 37.74) and Cohort 3 (n = 18; M = 36.83; SD = 26.87). Total gestures used by fathers in Cohort 1 (n = 27; M = 22.33; SD = 19.65) was similar to total gestures used by fathers in Cohort 2 (n = 38; M = 22.53; SD = 21.81) and Cohort 3 (n = 18; M = 35.78; SD = 31.18).

Differences based on race. The relationship between college student self-identified race and the numbers of gestures observed or word count from the family conflict interaction was also assessed using a MANOVA. No significant differences based on race were identified.

Hypothesis Testing

I used Pearson correlation to test my first hypothesis that family members who rate their families as high in cohesion will also use a high number of hand gestures. Similarly, I used Pearson correlation to also test my second hypothesis, that high levels of family conflict will be related to a high number of conduit and palm-revealing gestures. Results indicate a significant association between the total number of gestures used by family members and EA perceptions of family cohesion and family conflict such that more cohesion and conflict predicted fewer gestures ($r = -0.26$, $p \leq 0.05$ Fall semester cohesion, $r = -0.25$, $p \leq 0.05$ Spring semester cohesion, $r = 0.29$, $p \leq 0.05$ Spring semester conflict). When looking at the type of gestures separately, I again found a significant correlation between gestures and EA perceptions of family cohesion and family conflict, such that more cohesion and conflict were associated with more conduit gestures ($r=-0.28$, $p \leq 0.05$ pre-college cohesion, $r = 0.41$, $p \leq 0.05$ pre-college conflict, $r = 0.48$, $p \leq 0.05$ Fall semester conflict, $r = 0.45$, $p \leq 0.05$ Spring semester conflict). Fall semester cohesion was also correlated with representational ($r=-0.24$, $p \leq 0.05$) and in-palm gestures ($r=-0.29$, $p \leq 0.05$). Several correlations were found between student, father, and mother's cohesion and conflict, and total hand gestures and words used within the family, as well as gestures and words used by each party. Gestures were further broken down by type (representational, conduit, in-palm, and beat). For students, their FES scores were taken at three separate times: Pre-college, Fall, and Spring. For parents, FES scores were taken only once. Each of these sets of scores were correlated with the gesture and word-count data.

Pre-college student conflict was correlated with their own conduit gestures ($r = 0.28$, $p<0.05$) and in-palm gestures ($r = 0.24$, $p<0.05$). Their conflict was also correlated with their mothers' conduit gestures ($r = 0.32$, $p<0.05$) and fathers' conduit gestures ($r = 0.39$, $p<0.05$). Pre-college student cohesion was correlated with their fathers' representational ($r = -0.26$,

$p<0.05$) and conduit gestures ($r = -0.32$, $p<0.05$), as well as with father word count ($r = -0.30$, $p<0.05$).

Father cohesion was correlated with their child's representational gestures ($r = -0.35$, $p<0.05$) and the child's in-palm gestures ($r = -0.22$, $p<0.05$). In addition, father conflict was correlated with their own conduit gestures ($r = 0.28$, $p<0.05$). Fathers' perceptions of family cohesion (pre-college) were also correlated with in-palm gestures ($r=-0.22$, $p \leq 0.05$).

Mother cohesion was correlated with father in-palm gestures ($r = 0.29$, $p<0.05$), and father beat gestures ($r = -0.26$, $p<0.05$). In addition, mother conflict was correlated with the mother word count to gestures ratio ($r = -0.28$, $p<0.05$). Mother cohesion was correlated with father word count ($r = -0.39$, $p<0.05$).

In the Fall semester, student conflict was correlated with their own conduit gestures ($r = 0.26$, $p<0.05$), as well as their mothers' conduit gestures ($r = 0.35$, $p<0.05$), and fathers' conduit gestures ($r = 0.50$, $p<0.05$). Student conflict was also correlated with father word count ($r = 0.29$, $p<0.05$). Their cohesion was correlated with their mothers' conduit gestures ($r = -0.37$, $p<0.05$), and mothers' in-palm gestures ($r = -0.27$, $p<0.05$).

In the Spring semester, similarly to Fall, student conflict was correlated to their own conduit gestures ($r = 0.29$, $p<0.05$), their mothers' conduit gestures ($r = 0.30$, $p<0.05$), fathers' conduit gestures ($r = 0.47$, $p<0.05$), and father word count ($r = 0.39$, $p<0.05$).

Spring student cohesion was correlated with father word count ($r = -0.37$, $p<0.05$), their mothers' in-palm gestures ($r = -0.39$, $p<0.05$), fathers' representational gestures ($r = -0.32$, $p<0.05$) and fathers' beat gestures ($r = -0.26$, $p<0.05$).

Discussion

This thesis sought to explore the ideas of two different teams of psychologists: Chu, Meyer, Foulkes, and Kita's (2014) theory that a person's investment in a conversation could be measured by the frequency of hand gestures, and McGuigan, Vuchinich, and Tang's (2014) theory that families with low cohesion demonstrate negative communication behaviors in both verbal and nonverbal ways, and thus, families with high cohesion would demonstrate positive communication behaviors in both verbal and nonverbal ways. The hope was that the naturally communicative nature of gestures would translate into a visual demonstration of high and/or low cohesion.

The data showed results that both supported and refuted these hypotheses. My idea that both high cohesion families and low cohesion families would use more gestures was not reflected in the data collected; instead, all of the families in this study used gestures at a similar rate**.** However, the types of gestures (representational, conduit, palm-revealing, beat) families used seemed to correspond with cohesion level. Low cohesion families used higher numbers of conduit and palm-revealing gestures, whereas high cohesion families did not make use of any specific types of gestures. This finding provides support for the first half of my second hypothesis, which suggested that families with low cohesion would use more conduit gestures and palm-revealing gestures. However, my theory that high cohesion families would use more representational gestures was not reflected in the data.

There are several possible reasons why families with high cohesion did not show a difference in number of gestures produced. First, it is possible that FES is not a sufficient measure to detect the participants' levels of emotional investment in the particular conversations or subjects being discussed. Also, because only FES, a self-report measure, was used to gauge cohesion and conflict, and no observation measures were used, it is possible that the participants'

judgments of their own family cohesion and conflict were not entirely truthful or accurate. Third, it is possible that families who rate high in cohesion and low in conflict simply do not use as many gestures as those who rate low in cohesion and high in conflict. Because conflict is not strong in these families, it is likely that they do not experience high emotional strain or dysfunction. As such, family members are able to communicate freely and easily through speech, and while they do used gestures, it was not due to needing a communicative supplement. However, because the current study only found correlations with low cohesion/high conflict and number of gestures, and no correlations regarding the opposite, it is premature to come to any conclusions beyond speculation.

Gesture Type and Family Cohesiveness/Conflict

Representational gestures are by far the most common gestures seen in studies (Kita et al., 2017), but conduit and palm-revealing gestures are correlated far more frequently with communicative functions (Chu et al., 2014). Representational gestures can be made simultaneously for the benefit of the speaker and listener, and beat gestures are strictly "self" gestures: gestures that are for the speaker's benefit, and in turn, do not invite participation or reaction from the listener. While the listener may still be affected by the gesture usage, these types of gestures do not instigate a reaction, whereas conduit and palm-revealing gestures do, and representational gestures may.

The association of high conflict families with conduit and palm-revealing gestures may have several implications. Both types of gestures function as a way to manage interaction and direct conversation (Chu, et al., 2014): conduit gestures, to ensure that the listener is listening, and palm-revealing gestures, to either remove the gesturer's participation in the conversation, or to stop the conversation from moving forward. In this way, gestures do more than just aid the

presentation of information, they present an additional emotional layer to the ideas being communicated. And, while not measured in the present study, there is compelling evidence to suggest that the presence of hand gestures affects the listeners (Cook & Tanenhaus, 2009), adding a significant level of understanding to the overall message being communicated (Hostetter, 2011).

Individual findings

Gesture Type Totals

A closer examination of the findings reveals more questions than answers. When gesture types were taken into account, students proved consistently more perceptive than parents. Students' family conflict scores were positively correlated with conduit gestures all three times they were surveyed (Pre-Semester, Fall, and Spring), whereas mothers' reports of family were not correlated with gestures at all, and fathers' reports were only negatively correlated with palm-revealing gestures. It is possible that children are more sensitive to conflict and how it affects the family, which would correspond with claims in Phillips et al. (2015) that older adults are less sensitive to social cues and nonverbal communication. Another possible explanation for these findings is that parents have a deeper understanding of how conflict is not necessarily detrimental to the family unit, as suggested by Cox (1999). Conversely, it is possible that parents are simply not as in-tune with the conflict that exists within the family bonds. The fact that fathers' FES Cohesion scores were negatively correlated with palm-revealing gestures may be indicative of fathers viewing low cohesion as a threat to the family unit, as opposed to an opportunity to strengthen the family bonds (Cox, 1999). However, at this point, none of these explanations can be taken as more than speculation.

Total Gestures

Total gestures were also only correlated with student family conflict scores, with cohesion being negatively correlated with total gestures in the Fall and Spring, and conflict being positively correlated in the Spring. No parties had correlations during the pre-semester evaluation. It is possible that analyzing the total number of gestures, without distinguishing the types of gestures, does not provide a reliable measure of comparison against FES. However, the finding that students progressively began to correlate cohesion and conflict with total gestures

may speak to a growing awareness on the part of the student of the family dynamic, corresponding earlier reports that conflict within the family triad during the transition to college predict further conflict within the first year (Rogers et al., 2018). Again, however, it is not possible to do more than speculate on these findings without further study.

Types of Gestures/FES/Individual Gestures

This study also correlated the average student, mother, and father FES scores with the average number of times all students, mothers, and fathers used representational, conduit, palm-revealing, and beat gestures. The results produce a fascinating and detailed image of individual interactions and reactions between the family, taken through the lens of hand gesture categorization.

Again, during the pre-college assessment, students were the most affected by gestures and communication, with their understanding of their family's conflict being positively correlated with their own conduit and in-palm gestures, and with their mother's and father's conduit gestures. However, their cohesion scores negatively correlated with their mother's conduit and palm-revealing gestures. Their expressiveness scores also negatively correlated with their mother's conduit gestures.

However, by the spring semester, many of these correlations were no longer statistically significant, although conflict was still positively correlated with both student and parental conduit gestures, and cohesion was negatively correlated with mother's palm-revealing gestures, and father's representational and beat gestures. These last two were not significant correlations in the pre-college or fall semesters.

Conduit gestures appeared most frequently in these correlations. The fact that students correlated high conflict with all three party's conduit gestures may demonstrate the student's

understanding that the conduit gesture is both an acknowledgement of the conflict, and an invitation to engage in a conversation about it. In addition, the fact that their expressiveness scores were negatively correlated with their mothers' conduit gestures may speak to the fact that mothers talk more about behavior—and presumably correct said behavior—more than fathers (Merrill et al., 2015).

Another interesting finding is that fathers did not show any correlations between their family conflict scores and mothers' gestures, but their cohesion scores were negatively correlated with child representational and palm-revealing gestures, and their conflict scores were positively correlated with their own conduit gestures. Mothers' family conflict scores did not correlate with any of the child's activity or their own gestures, but their cohesion score was positively correlated with fathers' palm-revealing and negatively correlated with father's beat gestures.

Fathers, who consistently talked and gestured the least, were the only ones who had a correlation with representational gestures. It is difficult to interpret why fathers negatively correlated cohesion with their children's representational gestures, but it may be possible that, since children talk more to their mothers than fathers (Jiménez, 2008), and mothers provide more emotional support (Paterson et al., 1994), fathers felt this imbalance within the family the more the child gestured about general topics, as opposed to when the child gestured about emotional topics. Further study is necessary to interpret these results more definitively.

The fact that mothers' family conflict scores did not correlate with any of their children's gestures or their own gestures is another unique finding. It is possible that mothers did not perceive their own or their child's gestures to be a threat to the family bond (Lindahl & Malik, 2011), whereas the father's emotional involvement via palm-revealing gestures was viewed as having a positive effect on family cohesion, and father's more impatient, less meaningful

gestures were correlated with a perception of lower cohesion. Again, further study is needed to interpret these results beyond speculation.

Total Words Per Individual

There were no correlations between FES and average number of words spoken by students. Both students and mothers cohesion scores were negatively correlated with fathers' words, and students conflict scores were positively correlated with fathers' words in fall and spring. Students' expressiveness scores in the spring were also negatively correlated with mother's words.

Fathers spoke a comparable number of words to students, which suggests that the content of these words differed in a way that increased the perception of conflict, and decreased the perception of cohesion in the family. Fathers in triads are less involved but more emotional that mothers (Lindsey & Caldera, 2006), which may explain this observation. Future study will be needed in order to more accurately interpret these results.

Total words/gestures ratio

The only significant finding was that mothers conflict scores were negatively correlated with their own words per gesture ratio. This finding maybe be supported by the fact that mothers talk more when family discussion revolves around behavior (Merrill et al., 2015), and thus when mothers spoke more, they believed conflict within the family was being resolved.

Unanticipated findings

One of the most unexpected findings was that there were very few correlations with representational gestures or beat gestures, despite representational gestures being used far more than any other type of gesture in these interactions (av. 38.8), vs conduit (7.96), palm revealing

(1.96), and beat gestures (6.36). These results may suggest that emotional gestures are far more significant to cohesion than general gestures.

Another unexpected finding was that the actual average number of gestures in the 10 minute videos was not significantly different than the average number of gestures in the 15 minute videos. Despite the families in the 15 minute videos being given an additional five minutes of discussion time, the number of gestures was not higher**.** One possible explanation for this is that most families have a limit to the amount of time they can focus together on conflict resolution. Several families in the study found that they were able to quickly come to a resolution, and then used the rest of their mandatory time to discuss other topics ("That didn't take as long as I thought it would… now what are we supposed to do?"); other families with very high conflict seemed reluctant to pursue conflict resolution ("We've had a good day, I don't really want to get into that and start up a fight." or "Do we have to talk? We can just talk about whatever, can't we?").

Limitations

One of the biggest limitations of this study was that, as with all observational data, there is no way to control for content. Although the participants were instructed to discuss a conflict and come to a resolution within 10 or 15 minutes, most of the families did not stay focused on this task for the entirety of the time. However, because most of the families seemed to deviate away from the task for a comparable amount of time, and because the number of families who did not focus on the task at all was very low, this did not seem a significant enough problem to detract from the results.

Another limitation was that the population was overwhelmingly white/Caucasian, and there was no data collected on the participants' ethnic origins. Because multiple studies have found differences in gesture usage amongst the various countries in Europe (Chu et al., 2014), and among different religious groups (Vignoles et al., 2016), knowing participants' ethnic history and culture might have shed further light on the way gestures were used in their conflict resolution.

Another minor limitation is that FES has been shown to be unreliable for minority groups, specifically those from more collectivist cultures (Fok, Allen, & Henry, 2014), but since this sample was overwhelmingly homogenous, it does not seem like this issue would pose any major problems in the current data set.

This study also did not examine the reactions of the listeners to the speakers' gestures. There is significant evidence to suggest that gestures have effects on the listeners. However, since coding for that seemed beyond the scope of this study, it was not included in the coding process. However, one downside to this is that it is not possible to conclude whether or not an individual using gestures had any effect on the perceived cohesion or conflict resolution of the family.

This study did not look specifically at other children within the family. For example, if parents had already experienced sending a child off to college, then perhaps this transition would be somewhat easier as opposed to a family whose first or only child was leaving for college. While this data was partially available from this study, it was not taken into account for this particular thesis.

Further studies could look at more “at risk” families, as this sample was primarily upper-middle class, and also look at more diverse populations, as the majority of this sample was non-Hispanic whites. In addition, it may prove interesting to conduct this study while taking “observational” cohesion into account, not just self-assessment.

Conclusion

Gestures facilitate communication, and effective communication facilitates understanding. The human experience is rooted in the need to be understood, from the early hominins whose chance of survival hinged on their ability to communicate clearly with one another, to the triads in this study whose future as a cohesive family unit depended on their ability to address and resolve conflict in a healthy manner. But understanding is also a mutual experience, and humans have developed intricate languages with the precise goal of understanding each other better. The fact that we have not evolved away from gestures, but instead use them often—especially in times of heightened emotion, with heartfelt desire for deeper understanding—speaks not to the shortcomings of language, but to the enormity of human expression.

References

Acocella, J. (2002). The Neapolitan Finger. *Sign Language Studies 2*(2), 197-211. Gallaudet University Press.

Armstrong, D. F. (2008) The gestural theory of language origins. *Sign Language Studies, 8*(3), 289-314.

Boniel-Nissim, M., Lenzi, M., Zsiros, E., de Matos, M. G., Gommans, R., Harel-Fisch, Y., … van der Sluijs, W. (2015). International trends in electronic media communication among 11- to 15-year-olds in 30 countries from 2002 to 2010: Association with ease of communication with friends of the opposite sex. European Journal of Public Health, 25(Supp2), 41–45.

Briton, N. & Hall, J. (1995). Beliefs about female and male nonverbal communication. *Sex Roles, 32*(79), 79-90.

Chu, M., Meyer, A., Foulkes, L., Kita, S. (2014) Individual differences in frequency and saliency of speech-accompanying gestures: The role of cognitive abilities and empathy. *Journal of Experimental Psychology, 143*(2), 694-709.

Coe, J. L., Davies, P. T., & Sturge-Apple, M. L. (2018). Family cohesion and enmeshment moderate associations between maternal relationship instability and children's externalizing problems. *Journal of Family Psychology, 32*(3), 289–298.

Cohen, R. L., & Borsoi, D. (1996). The role of gestures in description-communication: A cross-sectional study of aging. *Journal of Nonverbal Behavior, 20*, 45-63

Cook, S., Tanenhaus, M. (2009) Embodied communication: Speakers' gestures affect listeners' actions. *Cognition, 113*, 98-104.

Corballis, M. C. (2010), The gestural origins of language. *WIREs Cognitive Science, 1*(1), 2-7.

Corballis, M. C. (2012). Did language evolve from manual gestures. *Gesture, 12*(2), 200-226.

Cowan, C., & Cowan, P. (2005). Two central roles for couple relationships: Breaking negative intergenerational patterns and enhancing children's adaptation. *Sexual and Relationship Therapy, 20*(3), 275–288.

Cox, M,. Brooks-Gunn, J. (1999) Studying conflict and cohesion in families: An overview. In M. Cox (Ed.) & J Brooks-Gunn (Ed.), Conflict and cohesion in families (pp. 1-10). New York: Routledge.

Cummings, E., Wilson, A. (1999) Contexts of marital conflict and children's emotional security: Exploring the distinction between constructive and destructive conflict from the children's perspective. In M. Cox (Ed.) & J Brooks-Gunn (Ed.), Conflict and cohesion in families (pp. 105-129). New York: Routledge.

de Ruiter, J.& de Beer, C. (2013) A critical evaluation of models of gesture and speech production for understanding gesture in aphasia, *Aphasiology, 27*(9), 1015-1030.

Esteve-Gibert, N., Prieto, P., & Liszkowski, U. (2017). Twelve-month-olds understand social intentions based on prosody and gesture shape. *Infancy, 22*(1), 108-129.

Fok, C. C. T., Allen, J., Henry, D. (2014). The Brief Family Relationship Scale: A brief measure of the relationship dimension in family functioning. *Assessment, 21*(1), 67–72.

Gans, S., & Johnson, V. (2016). Cortisol Response to Family Interaction as a Predictor for Adjustment. *Journal of Family Psychology, 30*(7), 812-821.

Gjerde, P. F. (1986). The interpersonal structure of family interaction settings: Parent–adolescent relations in dyads and triads. *Developmental Psychology, 22*(3), 297–304.

Greene, N., Jewell, D., Fuentes, J. & Smith, C. (2019) Basic need satisfaction in the parental relationship offsets millennials' worries about the transition to college, *The Journal of Social Psychology, 159*(2), 125-137.

Greenfield, P., & Yan, Z. (2006). Children, adolescents, and the Internet: A new field of inquiry in developmental psychology. Developmental Psychology, 42(3), 391–394.

Goldin-Meadow, S., & Saltzman, J. (2000). The cultural bounds of maternal accomodation: How Chinese and American mothers communicate with deaf and hearing children. *Psychological Science, 11*(4), 307–314.

Gomez-Baya, D., Rubio-Gonzalez, A., & Gaspar de Matos, M. (2018). Online communication, peer relationships and school victimisation: A one-year longitudinal study during middle adolescence. *International Journal of Adolescence and Youth, 24*(2), 199-211.

Gottman, J. (1979). Marital interaction: Experimental investigations. New York, NY: Academic Press.

Gottman, J. (1980). Consistency of nonverbal affect and affect reciprocity in marital interaction. *Journal of Consulting and Clinical Psychology, 48*(6), 711–717.

Gottman, J., Markman, H., & Notarius, C. (1977). The topography of marital conflict: A sequential analysis of verbal and nonverbal behavior. *Journal of Marriage and the Family, 39*(3), 461–477.

Gottman, J., & Porterfield, A. (1981). Communicative competence in the nonverbal behavior of married couples. *Journal of Marriage and the Family, 43*(4), 817–824.

Graham, J. A., & Argyle, M. (1975). A cross-cultural study of the communication of extra-verbal meaning by gestures. *International Journal of Psychology, 10*(1), 57–67.

Hall, J. (2004). Cicero and Quintilian on the Oratorical Use of Hand Gestures. The Classical *Quarterly, 54*(1), 143-160

Hamilton, E., Carr, A. (2016). Systematic review of self-report family assessment measures. *Family Process, 55*(1), 16–30.

Hepworth, B. (1970). *A pictorial autobiography.* New York: Praeger.

Hiester, M., Nordstrom, A., & Swenson, L. M. (2009). Stability and change in parental attachment and adjustment outcomes during the first semester transition to college life. *Journal of College Student Development, 50*(5), 521–538.

Hostetter, A. (2011) When do gestures communicate? A meta-analysis. *Psychological Bulletin, 137*(2), 297-315.

Hostetter, A., Hopkins, W. (2002). The effect of thought structure on the production of lexical movements. *Brain and Language, 82*(1), 22-29.

Jacobs, N., Garnham, A. (2007) The role of conversational hand gestures in a narrative task. *Journal of Memory and Language, 56,* 291-303.

Jiménez, Á. P. (2008). A longitudinal analysis of communication between mothers and adolescents. *Psychology in Spain, 12,* 1–12.

Jorio, A., & Kendon, A. (2000). Gesture in Naples and gesture in classical antiquity : A translation of La mimica degli antichi investigata nel gestire napoletano, Gestural expression of the ancients in the light of Neapolitan gesturing. Bloomington Indianapolis: Indiana University Press.

Jospe, K., Flöel, A., Lavidor, M. (2017) The role of embodiment and individual empathy levels in gesture comprehension. *Experimental Psychology, 64*(1), 56-64

Kendon, A. (2004) *Gesture: Visible Action as Utterance.* Cambridge University Press

Kita, S. (2000). How representational gestures help speaking. In D. McNeill (Ed.), Language and gesture (pp. 162–185). Cambridge: Cambridge University Press.

Kita, S., Alibali, M. W., & Chu, M. (2017). How do gestures influence thinking and speaking? The gesture-for-conceptualization hypothesis. *Psychological Review, 124*(3), 245-266.

Kitzmann, K. M. (2000). Effects of marital conflict on subsequent triadic family interactions and parenting. *Developmental Psychology, 36*(1), 3-13.

Krahmer, E. (2016) Can you handle this? The impact of object affordances on how co-speech gestures are produced. *Language, Cognition and Neuroscience, 31*(3), 430-440.

Krauss, R. M. (1998). Why do we gesture when we speak?. *Current Directions in Psychological Science, 7*(2), 54-60.

Larose, S., & Boivin, M. (1998). Attachment to parents, social support expectations, and socioemotional adjustment during the high school-college transition. *Journal of Research on Adolescence*, *8*(1), 1–27.

Leaper, C., Anderson, K., & Sanders, P. (1998). Moderators of gender effects on parents' talk to their children: A meta-analysis. *Developmental Psychology*, *34*(1), 3–27.

Leaper, C., & Smith, T. (2004). A Meta-Analytic Review of Gender Variations in Children's Language Use: Talkativeness, Affiliative Speech, and Assertive Speech. *Developmental Psychology, 40*(6), 993–1027.

Lewis, K. M. (2000). When leaders display emotion: How followers respond to negative emotional expression of male and female leaders. *Journal of Organizational Behavior, 21*(2), 221-234

Lindahl, K. M., & Malik, N. M. (2011). Marital conflict typology and children's appraisals: The moderating role of family cohesion. *Journal of Family Psychology, 25*(2), 194-201.

Lindsey, E. W., & Caldera, Y. M. (2006). Mother-father-child triadic interaction and mother-child dyadic interaction: Gender differences within and between contexts. *Sex Roles: A Journal of Research, 55*(7–8), 511–521.

Margolin, G., & Wampold, B. E. (1981). Sequential analysis of conflict and accord in distressed

and nondistressed marital partners. *Journal of Consulting and Clinical Psychology, 49*(4), 554–567.

Maricchiolo, F., Gnisci, A., Cerasuolo, M., Ficca, G., Bonaiuto, M. (2016) Speaker's hand gestures can modulate receiver's negative reactions to a disagreeable verbal message. *Toward Robotic Socially Believable Behaving Systems - Volume I,* Switzerland: Springer International Publishing.

Masson-Carro, I., Goudbeek, M., Novack, M., Goldin-Meadow, S. (2015) Learning from gesture: How our hands change our minds. *Educational Psychological Review, 27,* 405-412.

Masson-Carro, I., Goudbeek, M., Krahmer, E. (2016) Can you handle this? The impact of object affordances on how co-speech gestures are produced. *Language, Cognition and Neuroscience, 31*(3), 430-440.

McGuigan, W. M., Vuchinich, S., & Tang, C. (2014). Negative communication behaviors during family problem solving: Cohesion as a moderator in a growth curve analysis. *Journal of Family Communication, 14*(2), 95-111.

McNeill, D. (1985). So you think gestures are nonverbal? *Psychological Review, 92*(3), 350-371.

McNeill, D. (1992) Hand and mind: What gestures reveal about thought. Chicago, IL, US: University of Chicago Press.

Merrill, N., Gallo, E., & Fivush, R. (2015). Gender differences in family dinnertime conversations. *Discourse Processes, 52*(7), 533–558.

Miller, L., Tucker, C. (1993) The intrahousehold communications study: A typology of family cohesion. *Bureau of Labor Statistics, 1993, January.* 942-947.

Montepare, J., Koff, E., Zaitchik, D., & Albert, M. (1999). The use of body movements and gestures as cues to emotions in younger and older adults. *Journal of Nonverbal Behavior, 23*(2), 133–152.

Moos, R., & Moos, B. (2009). *Family Environment Scale manual* (4th ed.). Palo Alto, CA: Consulting Psychologists Press.

Moreira, J. F. G., & Telzer, E. H. (2015). Changes in family cohesion and links to depression during the college transition. *Journal of Adolescence, 43,* 72–82.

Nespoulous, J., Perron, P., & Lecours, A. (2014). The Biological Foundations of Gesture: Motor and Semiotic Aspects. New York, NY; East Sussex: Psychology Press.

Novack, M., Goldin-Meadow, S. (2015) Learning from gesture: How our hands change our minds. *Educational Psychological Review, 27,* 405-412.

Özçalışkan, Ş., Goldin-Meadow, S. (2010) Sex differences in language first appear in gesture. *Developmental Science, 13*(5), 752-760.

Parade, S., Leerkes, E., & Blankson, A. (2010). Attachment to parents, social anxiety, and close relationships of female students over the transition to college. *Journal of Youth and Adolescence, 39*(2), 127–137.

Paterson, J. E., Field, J., & Pryor, J. (1994). Adolescents' perceptions of their attachment relationships with their mothers, fathers, and friends. *Journal of Youth and Adolescence, 23*(5), 579–600.

Phalet, K., Schönpflug, U. (2001). Intergenerational transmission of collectivism and achievement values in two acculturation contexts: The case for Turkish families in Germany and Turkish and Moroccan Families in the Netherlands. *Journal of Cross-Cultural Psychology, 32*(2), 186-201.

Phillips, L. H., Allen, R., Bull, R., Hering, A., Kliegel, M., & Channon, S. (2015). Older adults have difficulty in decoding sarcasm. *Developmental Psychology, 51*(12), 1840–1852.

Rogers, A. A., Updegraff, K. A., Iida, M., Dishion, T. J., Doane, L. D., Corbin, W. C., … Ha, T. (2018). Trajectories of positive and negative affect across the transition to college: The role of daily interactions with parents and friends. *Developmental Psychology*, *54*(11), 2181–2192.

Saucier, D., Elias, L. (2001) Lateral and sex differences in manual gesture during conversation. *Laterality, 6*(3), 239-245.

Salerno, J. M., Phalen, H. J., Reyes, R. N., & Schweitzer, N. J. (2018). Closing with emotion: The differential impact of male versus female attorneys expressing anger in court. *Law & Human Behavior (American Psychological Association)*, *42*(4), 385–401.

Small, M. L., Morgan, N., Abar, C., & Maggs, J. L. (2011). Protective effects of parent-college student communication during the first semester of college. *Journal of American College Health*, *59*(6), 547–554.

Takano, Y., Osaka, E. (1999). An unsupported common view: Comparing Japan and the U.S. on individualism/collectivism. *Asian Journal of Social Psychology, 2*, 311-341.

Theocharopoulou, F., Cocks, N., Pring, T., & Dipper, L. T. (2015). TOT phenomena: Gesture production in younger and older adults. Psychology and Aging, 30(2), 245–252.

Trigo, T., Pellegrino, S. (2010). An analysis of features for hand-gesture classification. *17th International conference of Systems, Signals, and Image Processing*, 412-415

Urakami, J. (2014). Cross-cultural comparison of hand gestures of Japanese and Germans for tabletop systems. *Computers In Human Behavior, 40*, 180-189.

Vignoles, V., et al. (2016). Beyond the ‘East-West’ dichotomy: Global variation in cultural

models of selfhood. *Journal of Experimental Psychology: General, 145*(8), 966-1000.