PSYNAPSE

ISSUE 4

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The Psynapse team would like to thank everyone who helped us navigate the obstacles of creating the inaugural publication of the Psynapse, which has, in turn, led to what you are viewing today.

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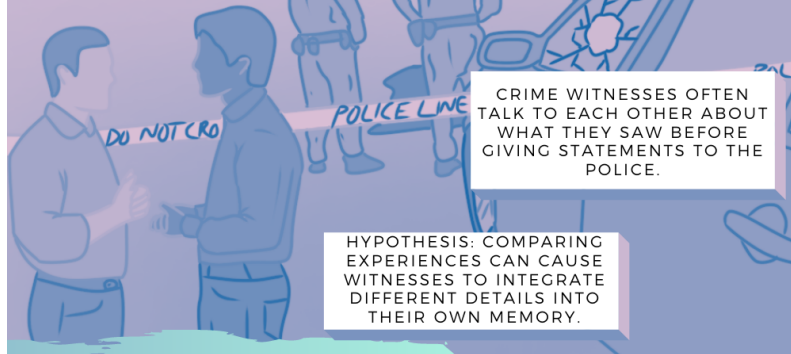
ACKNOWLEDGMENTS

INFOGRAPHICS

6 / Memory Consolidation
Between Witnesses Infographic

MEMORY CONSOLIDATION BETWEEN WITNESSES

BY: HELENA SCHWADE

A STUDY ON

Memory Consolidation Between Witnesses

RESEARCHERS: GARRY, FRENCH, KINZETT & MORI

DO NOT CRO

POLICE LINE

CRIME WITNESSES OFTEN TALK TO EACH OTHER ABOUT WHAT THEY SAW BEFORE GIVING STATEMENTS TO THE POLICE.

HYPOTHESIS: COMPARING EXPERIENCES CAN CAUSE WITNESSES TO INTEGRATE DIFFERENT DETAILS INTO THEIR OWN MEMORY.

METHODS

N=40
NEW ZEALAND

PAIRS OF PARTICIPANTS WATCHED A VIDEO OF A CRIME WHILE SITTING NEXT TO EACH OTHER. UNKNOWN TO THEM, THE VIDEOS HAD SLIGHTLY DIFFERENT DETAILS.

POLARIZED GLASSES ALLOWED THEM TO WATCH TWO DIFFERENT FILMS WITHOUT KNOWING.

AFTER WATCHING THE VIDEO, PAIRS WERE ASKED TO DISCUSS AND ANSWER QUESTIONS ABOUT THE FILM COLLABORATIVELY. SOME QUESTIONS ASKED ABOUT DETAILS THAT WERE NOT THE SAME IN BOTH FILMS.

LATER, PARTICIPANTS DID AN INDEPENDENT TEST ABOUT THE DIFFERING DETAILS.

RESULTS
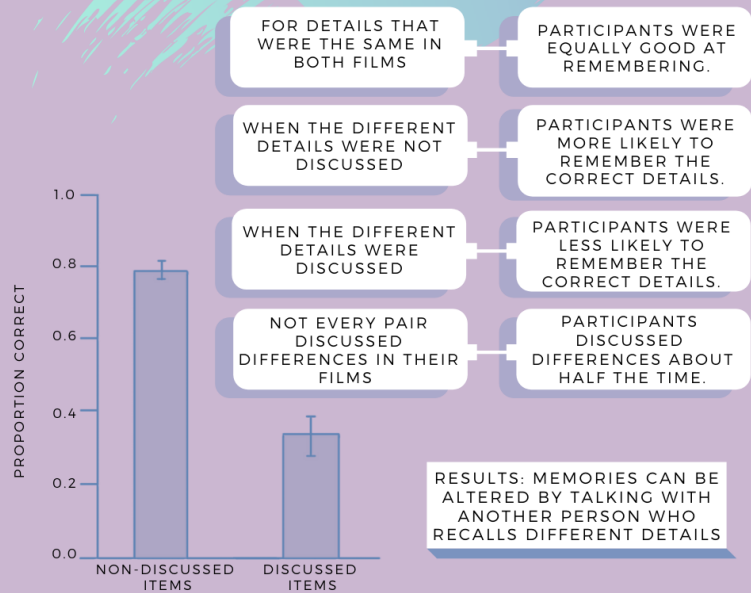
FOR DETAILS THAT WERE THE SAME IN BOTH FILMS → PARTICIPANTS WERE EQUALLY GOOD AT REMEMBERING.

WHEN THE DIFFERENT DETAILS WERE NOT DISCUSSED → PARTICIPANTS WERE MORE LIKELY TO REMEMBER THE CORRECT DETAILS.

WHEN THE DIFFERENT DETAILS WERE DISCUSSED → PARTICIPANTS WERE LESS LIKELY TO REMEMBER THE CORRECT DETAILS.

NOT EVERY PAIR DISCUSSED DIFFERENCES IN THEIR FILMS → PARTICIPANTS DISCUSSED DIFFERENCES ABOUT HALF THE TIME.

(Bar chart: Y-axis "PROPORTION CORRECT" from 0.0 to 1.0; X-axis categories "NON-DISCUSSED ITEMS" approximately 0.79 and "DISCUSSED ITEMS" approximately 0.33)

RESULTS: MEMORIES CAN BE ALTERED BY TALKING WITH ANOTHER PERSON WHO RECALLS DIFFERENT DETAILS

REPLICATION
RESEARCHERS: ITO ET AL.

N=486
BRAZIL
CANADA
COLUMBIA
INDIA
JAPAN
MALAYSIA
POLAND
PORTUGAL
TURKEY
UNITED KINGDOM

SAME METHODS.
SAME EFFECT SEEN IN EVERY COUNTRY.

IMPLICATION: CRIME INVESTIGATION PROCESSES TEND TO CHANGE BASED ON SCIENTIFIC RESEARCH. WITNESSES MAY NEED TO BE HANDLED DIFFERENTLY IMMEDIATELY AFTER A CRIME TO GET MORE ACCURATE WITNESS STATEMENTS.

INFOGRAPHIC BY: HELENA SCHWADE
SOURCES: GARRY, M., FRENCH, L., KINZETT, T., & MORI, K. (2008). EYEWITNESS MEMORY FOLLOWING DISCUSSION: USING THE MORI TECHNIQUE WITH A WESTERN SAMPLE. APPLIED COGNITIVE PSYCHOLOGY, 22, 431-439.
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PRÉCIS

WHAT IS SYNESTHESIA?

BY: CATHERINE BOSYJ

Multisensory association characterizes synaesthesia. Individuals with synaesthesia experience a merging of senses in which the stimulation of one sense triggers an involuntary reaction in another sense (i.e., seeing sounds, hearing colours, etc.). Advanced cognitive abilities such as improved memory, vivid mental imagery, and greater attention to detail increase the likelihood an individual will develop synaesthesia. Closely related relatives of synaesthetes also inherit these cognitive abilities, which suggests a genetic component responsible for developing synaesthesia. Further research into the genetic component of synaesthesia will provide a deeper understanding of this perceptual phenomenon.

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CAN ORCHESTRAL MUSIC IMPROVE PERFORMANCE?

BY: KAREN CHAN

Certain students with special educational needs (SEN) lack motor coordination skills, which interferes with completing various school tasks. Difficulties with school tasks increase frustration for SEN students and consequently impede their learning. Mozart's orchestral music addresses this issue by reducing frustration through a decrease in heart rate and blood pressure. The decrease in frustration increases students' concentration, which boosts motor coordination skills. This adjustment in coordination skills gradually improves overall academic performance. Incorporating orchestral music interventions in the school environment provides SEN students the potential to overcome their academic barriers.

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SLEEP ON IT: THE IMPORTANCE OF SLEEP FOR INSIGHT

BY: AADITHYA UDAYA SHANKAR

Solving problems requires a deep understanding of complex information. Sleep provides this insight for problem-solving by reprocessing memory representations. The reprocessing of memory representations during sleep drives the consolidation of memory for insight acquisition. Along with consolidation, memory representations are rearranged into new structures during sleep. The new structures of prior memories—especially recent memories—results in insight, manifesting as new explicit knowledge applicable to a problem. This phenomenon is common; anecdotally, many great scientific discoveries have been the result of insights gained from sleep, such as the chemical transmission of neurotransmitters. When struggling with a challenging problem, the best course of action may be to sleep on it.

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OUR OPTIMISTIC OUTLOOK

BY: DUSAN KOVACEVIC

Humans are hopeful creatures. We make positively biased predictions, such as thinking that we will win the lottery, despite the low probability. Our tendency to overestimate the likelihood of positive events and underestimate the likelihood of negative events is known as optimism bias. Optimism bias has advantages and disadvantages. When we expect positive outcomes, we feel less anxious and lower our risk for depression. However, when we underestimate risks, we neglect precautionary behaviours such as foregoing car insurance, believing that we will avoid accidents. Nevertheless, we have evolved to be hopeful thanks to the benefits of optimism.

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SETTINGSCOMPARING TACTILE TO AUDITORY GUIDANCE FOR BLIND INDIVIDUALS

BY: ALI REZAZADEH SHIRAZI

Many blind individuals use auditory navigation tools, such as GPS prompts, to safely navigate their environment. Although auditory commands have improved blind individuals' independence, they endanger users' lives by interfering with their environmental awareness. Tactile belts address this issue by delivering tactile navigation commands to blind individuals using vibration motors found in smartphones. These devices vibrate users' skin on their waist to signal a right or left turn without diverting their attention away from environmental sounds. Tactile belts improve how blind individuals interact with their environment, saving them from accidents and easing their day-to-day lives.

Figure 1. The image above illustrates tactile belts.

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MUSIC EDUCATION: MORE THAN MEETS THE EAR

BY: KAILEY PAIGE MCMILLAN

Children with autism often lack conventional communication skills. They function best in structured environments, yet social settings often lack identifiable structure. Music's inherent structure tailors toward the unique characteristics of autism, allowing these children to develop exceptional musical abilities—imitating melody, rhythm, and pitch. Given their musical strengths and social struggles, music enables children with autism to experience spontaneous personal expression beyond the modality of spoken language, which improves their communication skills. Joint music making also facilitates group cohesion and alleviates the social isolation autistic children face. The communicative social skills that children with autism develop through music calls for educators to incorporate musical interaction in their classes.

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LAUGH FOR FRIENDS, FRIENDS FOR LAUGHING

BY: JACK PHILLIP ALBERT HALLMAN

Socializing and laughter complement each other. Cheerful laughter promotes social interaction by promoting feelings of relaxation. Relaxation arises because laughter triggers the release of pain-relieving neurotransmitters such as endorphins in the brain. Similarly, social interaction also promotes laughter. Laughter occurs up to 30 times more in the context of social gatherings. This correlation may demonstrate the effectiveness of laughter as a social tool and the importance of having a strong sense of humour. Consider revising your throw pillow mottos: "laugh, laugh, laugh".

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THE IMPACT OF MONTESSORI EDUCATION ON STUDENTS

BY: MEGAN WERGER

Montessori—a style of education that nurtures strong social and interpersonal skills—has become increasingly prevalent for education. Montessori schools' practice of peer teaching relies on peer collaboration. Working together cultivates students' understanding of fairness. Montessori students' knowledge of fairness leads to reasoning based on principles of justice which results in positive outcomes during social dilemmas. Practicing appropriate responses to social dilemmas prepares students for daily social interactions. Montessori students display increased sharing and less negative interactions with their peers compared to students from other educational systems. The impact on Montessori students' behaviour, and by extension their interactions with peers, leads to the development of a strong sense of community.

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PSYNAPSE

ADVANCED TOPICS

WANT TO GET A BETTER SLEEP? STOP TAKING YOUR SMARTPHONE TO BED

BY: ALEXIS TORKOS

Are you addicted to your smartphone?

The average smartphone user will check their device 84 times every day (Andrews, 2015). The ever-growing dependency with which we treat our smartphones makes them an increasingly pivotal component in our lives. We use our smartphones for communicating with friends and family, surfing the internet, answering work emails—the list is endless. Our sleep, on the other hand, is far from it.

How well do you sleep?

Research suggests that if you find yourself using your smartphone before bed, it's likely that you will sleep poorly. Not only is screen-time before bed harmful, it's also extremely prevalent; approximately 85% of smartphone users check their phones within 1 hour of bedtime (Andrews, 2015).

The American National Sleep Foundation (ANSF) conducted a poll in 2011 to determine just how common technology-related sleep disturbances are (Gradisar et al., 2013). While 90% of Americans reported technology usage in the hour before bed, the number was a staggering 96% for adults under 30. The poll revealed that those who engaged in bedtime technology usage were also more likely to: (i) have difficulty falling asleep, and (ii) report unrefreshing sleep. This suggests that many Americans may experience sleep related disturbances due to their technology usage—whether they know it or not.The poll also found that many Americans go to sleep without turning off their phone. More than half of people who do not completely turn off their phones before bed also leave their ringers on; this gives way to sleep disturbances from notifications and, ultimately, to reduced sleep quality (Gradisar et al., 2013).

A similar study, conducted at the University of Sydney, asked adolescents to complete a similar survey to the one used in the ANSF poll (Gamble, 2014). Adolescents who reported spending more hours on their deviceswere more likely to have delayed sleep and wake schedules. They were also more likely to wake later by more than 2.5 on weekends relative to weekdays. The researchers also suggested that the use of technology when in bed has the potential to disrupt sleep by conditioning you to associate being in bed with wakefulness rather than sleep (Gamble, 2014).

Researchers at the University of Rhode Island investigated the link between evening technology use, sleep quality, and mental well-being (Adams, 2013). Undergraduate students were asked to complete self-report questionnaires and maintain a 7-day sleep diary to monitor habits such as bedtime, time taken to fall asleep, wake up time, and cell phone usage in bed. Data analysis revealed that greater amounts of technology use before the onset of sleep predicted poor sleep quality, which in turn predicted symptoms of both depression and anxiety. Participants reported a myriad of symptoms, including: concentration problems, loss of energy, daytime sleepiness, and anxiety about their ability to perform (in school, social relationships, and sport). The findings suggest that sleep quality mediates the relationship between technology use and psychological problems, such as depression and anxiety. While technology usage does not directly impact mental well-being (at least, not in the context of its relationship with sleep), it does impact sleep quality which plays a large role in mental wellbeing (Adams, 2013).

Findings demonstrating the negative effects that technology use has on sleep quality are concerningly consistent, especially in adolescents. Poor sleep is a common problem among adolescents due to hormonal changes that are further compounded by the societal demands of adolescence. Puberty triggers hormonal changes which delay circadian rhythms (sleep/wake cycles), producing a greater drive towards sleeping later and thus waking up later (Carskadon, 1999). Regardless of these physiological demands, schools require adolescents to wake up early. In addition to these conflicts, adolescents are often heavy users of electronic devices compared to other age groups.

Being the heaviest users of electronic devices, adolescents are often a major focus in the research literature. A study based in the United Kingdom surveyed adolescents' (aged 13-21) sleep habits, concluding that inadequate sleep was a major concern due to its high prevalence in adolescence (Johansson, 2016). Technology use was significantly correlated with poor sleep quality—similar complaints to those reported in the American and Australian studies discussed. The study found that 97% of adolescent respondents used some form of technology before sleep. In addition, those who reported having "inadequate" sleep had greater frequencies of technology use before bed. These results are concerning as adolescents require proper sleep for growth, mental well-being, and academic performance (Johansson, 2016).

What about technology specifically affects sleep quality, then? There is, unfortunately, no straightforward answer to this question. Research suggests that both psychological arousal and melatonin suppression are part of the problem.

Evidence suggests that arousal from device use interferes with sleep preparation. A study conducted by Arora and colleagues (2014) examined the association between sleep quality and different types of electronic devices used before bed. Questionnaires were given to adolescent participants (age range used in study) to investigate their sleep habits and technology usage. The negative impactsthat technology usage before bed had on sleep quality were most pronounced in participants who reported using interactive devices, such as video game consoles, cell phones, and computers. The authors suggested that arousal from using interactive devices interfered with the ability for the body to 'wind-down', prolonging the time it takes for one to fall asleep (Arora, 2014).

Notably, the study also offered a novel approach in the field by examining parasomnias (sleep disorders) among the adolescent participants. Interestingly, the specific parasomnias identified varied with the types of devices used at bedtime (Arora, 2014). Music listeners were at increased risk for having nightmares, this is a result of creating visual imagery that translates into adverse dreams.
Television viewers, in contrast, were more likely to report sleepwalking episodes. Both nightmares and sleepwalking can be extremely stressful, producing subsequent disruptions in sleep quantity and quality (Arora, 2014).

Other lines of inquiry suggest that blue light from light-emitting diode (LED) lights used in common household electronics is to blame for poor sleep. A study based in South Korea instructed adolescents to play smartphone games with either conventional LED or suppressed blue light LED before bed (Heo, 2017). After using each smartphone, individuals completed sleep-related questionnaires and provided saliva samples. Those who used blue light smartphones reported being less sleepy and experienced a longer time to reach dim light melatonin levels (which are important for keeping the body on a regular sleep/wake schedule). These results suggest that electronic device use before bed negatively impacts sleep quality and duration by inducing physiological changes which inhibit the body's natural sleep preparation mechanisms (Heo, 2017). It's likely that the combined effect of arousal and blue light stimulation contributes to technology's adverse effects on sleep.

 Finally, the million-dollar question: what can be done to improve sleep quality?

A little myth-busting should first be done on the topic.

Apple's popular 'Night Shift' feature adjusts screen colours towards the warm end of the colour spectrum (Figure 1), claiming to make the display easier on your eyes during the night (Chang, 2015). Apple also claims that this feature was introduced in response to research supporting the negative impacts that blue light exposure has on melatonin suppression. The company's claims are not only unsupported by scientific evidence, they are also incomplete contradiction of it (Chang, 2015).

Figure 1. Cellphones with Apple's 'Night Shift' feature enabled on the left (warm tone screen) and disabled on the right (cool tone screen) (Download Messenger, 2020).

A study published by the Lightning Research Institute suggests that changing the colour composition of the displays may be insufficient for preventing impacts on melatonin suppression (Nagare, 2018). Study participants were exposed to different device lighting conditions and provided saliva samples before, during and after the session. Analysis of melatonin levels between conditions showed that melatonin levels did not significantly differ between colour corrected and non-colour corrected modes. The researchers conclude that colour correction used in the 'Night Shift' mode is insufficient, as the display still emits enough blue light to affect user melatonin levels. Furthermore, the 'Night Shift' mode neglects the role that display brightness can play in altering melatonin levels. Without also dimming the device brightness, 'Night Mode' will have an insignificant effect (Nagare, 2018).

The simple solution for improved sleep, unsurprisingly, lies in changing evening technology use habits. There is, after all, a reason why your eyes hurt after staring at your smartphone in the dark. The negative effects that technology has on sleep arise from technology use in the hour preceding sleep. This suggests that users should consciously plan their evenings before bed without their devices. Sleep hygienist typically advise of removing all electronic devices from bedrooms, however that may not be a realistic solution for most people.

Many studies have found a dose-dependent relationship between technology use and sleep quality. If you aren't ready to completely give up technology before bed, you can still improve sleep quality by cutting down on usage duration.

It's not too late to change your own screen time habits to promote better sleep.

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ALTRUISM

BY: AMNA AZHAR

You are walking to class the day after an ice storm when you slip on a patch of black ice and fall onto your back. A stranger walking by helps you up and asks if you are alright. Although this may be an uncommon scenario, humans have evolved to help people, even if it means getting hurt in the process. The process of helping another individual sometimes at the expense of oneself is described as altruism. Altruism is an adaptive behaviour prevalent in humans as well as animals, since it helps in the species survival. However, sometimes costly behaviours are performed for individual short-term benefits. Hamilton's rule depicts how altruistic an individual is going to be. Often, the amount of people surrounding an individual impacts how altruistic an individual is. Altruism also exists in animals like the honey bee who perform the waggle dance when they find high quality nectar. The waggle dance notifies the fellow bees about the presence of a viable food source nearby (Von Frisch & Chadwick, 1967).

Altruism is an innate behaviour and can be displayed in numerous ways. In animals, any behaviour that increases the fitness of an individual's relatives is a form of altruism, including parenting and food sharing (Rushton, 1991). A common example of innate altruistic behaviour is the poisonous sting of a honey bee, which kills the bee but prevents the other bees in the colony from being attacked or killed. With humans, it is common for people living in communities to help others out, especially when the individual has helped the actor in the past. However, altruistic behaviour is only performed if its benefits outweigh the cost.

Hamilton's rule depicts whether an altruistic behaviour will help an individual. The rule states that an individual should only be altruistic if the benefits outweigh the costs associated with the act of altruism (West et al., 2001). The only exception to when an individual should help another individual regardless of costs outweighing benefits, is when the individual is closely related to the actor (West et al., 2001). Relations to the actor are an important aspect of altruism, however, actors often help individuals that they are not related to in any way. This is likely shaped by parochialism—a preference for members who have same ethnicity, race and language as the actors (Bernhard et al., 2006; Kurzban et al., 2015). Parochialism is a form of altruism important for resolving inter-group conflicts (Bernhard et al., 2006). This behaviour involves favouring your own group members as it allows for an increase in resources. This preference is because members tend to look out for each other more, increasing inclusive fitness. The leader of such groups punish outer-group members more harshly than they would punish their own group members, thereby increasing the fitness of the group. Such behaviours make altruism an important aspect of maintaining relationships with the individuals around them (McCullough et al., 2008).

An individual's environment plays an important role in determining if they will behave altruistically. Cooperation, a form of altruistic behaviour, signals that individuals would deal with the costs associated with a behaviour in order to benefit others. Individuals are more likely to cooperate with one another if there are people around them who they want a good rapport with. It is important to display cooperation if it will impact partner interactions in the future (Barclay & Willer, 2006). By showing that one is cooperative (and altruistic), individuals may increase their chances of obtaining a mate, as they are more likely to outcompete their competitors. Individuals gain exclusive access to mates by displaying these properties. In a study conducted by Barclay and Willer (2006), participants displayed altruistic properties when they were asked to donate money while potential mates were nearby. In addition, they found that individuals surrounded by potential mates were more likely to donate larger sums of money. Although cooperative behaviour is costly, it is not selected against as individuals are still pursuing their interests (West et al., 2007). Individuals only cooperate when it benefits them and their kin.

An example of cooperation can be found in the actions of the honey bee, who go to great lengths to increase the efficiency of their colonies. Specifically, the waggle dance is an altruistic behaviour that helps other honey bees in the colony survive. Honeybees dance in figure-eight patterns that signal the direction and distance of food source, and even take other honeybees from their colonies to the food source (Von Frisch & Chadwick, 1967). Although the waggle dance benefits the colony by keeping them together and providing information to others about the food source, there are also costs involved. Instead of keeping this information to themselves and maximizing their resources, honey bees are informing the colony that there is a food source nearby. Since they also guide other honeybees to the food sources, they are utilizing energy and risking predation when leaving the safety of their hives to guide others to the food source. Misinforming other bees about the location of the food source would also be beneficial for the honeybee as it would be keeping more food for itself, while wasting other bees' energy and risking their lives. However, bee colonies that are healthier and more efficient will be favoured by natural selection. By helping other bees in its colony, the bee is benefitting itself in the long run.

On the contrary, many may argue that altruism is not an adaptation but an exaptation or a constraint (Andrews et al., 2002). Exapted traits have consequences and can occur if one of the following criteria is met: the trait initially evolved as an adaptation but exapted to another effect; the trait is a byproduct of selection for another trait due to genetic linkage, and thus gets exapted (Andrews et al., 2002). Altruism evolved to help a specie's survive by ensuring they help those around them only if the cost does not outweigh the benefits. This also ensures that altruism is not a constraint as the trait does not favour a direction (Andrews et al., 2002). Although the trait evolved to help a specie's survival, the beneficial effects occur only when the conditions are met. If the species fails to meet the criteria for altruism, it may result in its death, and even extinction. The purpose of altruism is to prevent an organism from carrying out actions that will hurt its fitness and lower its chances of survival.

In conclusion, altruism and other essential behaviours have been selected for to help individuals survive. Altruistic tendencies help us maintain our social relations by allowing us to cooperate with others. Although behaviours like cooperation may have costs associated with them, they also come with benefits such as easier access to mates. Cooperative individuals are more likely to outcompete their competitors by displaying their altruistic behaviours. Animals like honeybees help their colonies by helping each other find food.

They do this even though they are at the risk of predation while helping another bee. Such examples demonstrate that altruism is an innate behaviour in humans as well as animals. However, individuals do not perform altruistic behaviours without a second thought. Hamilton's rule suggests that individuals are only altruistic towards others if the benefit of helping another individual outweighs the cost of energy and resources spent. Displaying these behaviours has allowed us to succeed as individuals and are essential to helping us survive by increasing our fitness.

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EXAMINING THE EFFECTS OF AN IMPROVISATION GROUP ON SOCIAL ANXIETY AMONG YOUTH: A PILOT STUDY

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ABSTRACT

Theatrical improvisation is an activity that involves performing a scene without any preparation, which a number of studies have found to enhance players' interpersonal skills and both their physical and mental wellbeing. With its often jovial and community-building nature, it has potential in alleviating some of the mood-related challenges that may accompany mental illnesses such as social anxiety disorder (SAD). This disorder is important to address, especially in youth, as it is a common disorder that has various impacts on individuals ranging from difficulty in everyday social interactions to hindering school and community engagement. Thus, improvisation was investigated as a non-traditional form of therapy for SAD. Over the course of the 12-week program, improvisation was practised by a group of help-seeking youth at a mental health facility. Qualitative methodology allowed for the analysis of interviews conducted with participants. Key quotations were categorized into four distinct themes, which describe particular aspects and effects of improvisation. They are common points that were echoed by the vast majority of the interviewed participants. The four common themes included Challenging Anxiety, Community, Life Skills, and General Positive Impact. Furthermore, quantitative findings derived from Subjective Units of Distress Scale (SUDS) revealed a statistically significant decrease in distress scores when comparing ratings obtained at the beginning versus the end of each improvisation session. The predominantly positive results of this pilot study suggest that improvisation may be an effective means of reducing SAD and spurring personal growth. Not only is it a form of exposure therapy that allows participants to confront their fears in a non-judgemental setting, but it may also serve as a supplemental intervention to traditional interventions that may not be suitable for some individuals.

INTRODUCTION

Anxiety disorders are the most prevalent of all psychiatric disorders, with the most common, particularly among youth, being Social Anxiety Disorder (SAD), also known as social phobia (Kessler et al. 2005). Although many youth experience symptoms of fear or distress that may not meet the criteria for an anxiety disorder based on the DSM, these symptoms still negatively impact their ability to have a high level of functionality and engagement in school and their community (American Psychiatric Association, 2013; Mesa et al., 2014). Thus, appropriate and timely intervention ensures that youth are able to achieve their goals and live better lives. While interventions such as Cognitive Behaviour Therapy (CBT) and Group CBT (GCBT) have demonstrated positive results in treating SAD (Hayes et al., 2008), there is evidence to suggest that alternative therapies may complement CBT or serve as alternative options for youth who may not respond well to traditional therapies (Sheesley et al. 2016).

Instead, interventions that facilitate a non-judgemental environment and focus on positivity (e.g., positive emotions and laughter) serve as complementary interventions (Kashdan & Stagar, 2006). As such, improvisational comedy may supplement traditional interventions and contribute to positive coping methods for dealing with social anxiety. Improvisation is a type of theatrical performance where scenes are created on the spot without a script. Its benefits are well recognized: improvisation is known to promote group cohesiveness, improve interpersonal skills, build confidence, increase self-reflection, and promote a sense of hopefulness (Kindler & Gray, 2010; Bermant, 2013; Misch, 2016). Improvisation also creates a space for individuals to explore their fears and consider alternate solutions (Yorton, 2005) since participants must try to see a situation from another's perspective in order to play out a scene. Ultimately, improvisation contributes to better physical and mental health, decreases stress, and thereby decreases anxiety (Misch, 2016).

Although limited research has been conducted to explore the effects of improvisation on SAD, there is relevant literature about the benefits of certain components of improvisation and similar interventions. For example, the use of role-playing in therapy settings creates positive outcomes for children with high levels of anxiety (Akinsola & Udoka, 2013). As Blatner (2002) explained, "This makes the therapy session into a kind of 'fail-safe' laboratory in which participants can explore self-expression of feelings that are not generally acceptable in conventional society, much less in the sensitive context of many families" (p. 35). Additionally, the use of laughter and humour can have positive effects on mental health in general (Rudnick et al., 2014). Studies of humour-related interventions (e.g., stand-up comedy training) demonstrate benefits such as increased self-esteem, improvements in interpersonal skills, and promoting healthy coping with anxiety (Rudnick et al., 2014). Similarly, laughter therapy is successful in decreasing anxiety, depression, and psychological distress (Kim et al., 2015) and even has positive physiological effects such as muscle relaxation and stress relief (Sheesley et al., 2016). The evidence demonstrates the benefits of various components of improvisation. However, an experimental study is needed to specifically study the effects of participating in an improvisation intervention on SAD symptoms.

The aim of this pilot study was to investigate the effects of improvisation in a group of help-seeking youth at risk of developing a range of mental health disorders, including SAD, in order to test the feasibility of the proposed approach of the intervention and to gain an understanding of how participating in an improvisation group might benefit help-seeking youth. As part of the pilot, help-seeking youth were recruited through the Youth Wellness Centre (YWC; Wang et al., 2020) at St Joseph's Healthcare Hamilton. They participated in a 12-week improvisation program and completed pre- and post- measures, weekly self-ratings, and a qualitative interview upon completion of the group.

METHODS
This pilot study used a mixed-methods approach by collecting and analyzing both qualitative and quantitative data. This design is increasingly used in mental health research as the addition of qualitative interviews provides complementary data and adds more depth to the information collected (Palinkas 2014).

 In order to strengthen the internal validity of the study, triangulation was used to analyze data. Following individual analysis, the research team agreed upon four common and emerging themes found in the qualitative data in order to strengthen validity and reliability. Inter-rater reliability was reached through an audit trail conducted by another member of the research team who reviewed individual field notes and identified similarities in coding. Enough similarities between the researchers' analyses were noted for each theme, which ensured the strength of the coding scheme.

Inclusion/exclusion criteria

Help-seeking emerging adults between the ages of 17 and 25 were recruited from the YWC. For this pilot study, participants were not excluded on the basis of mental illness or addiction concerns. Participants had to attend at least three sessions to be eligible for the study.

Intervention

The improvisational sessions were offered as a 12-week group open to all clients, with each session lasting 1.5 hours. The sessions were co-facilitated by an experienced improviser, YWC staff, and a Master's student in Social Work. A typical session began with stretching, breathing, and an activity to promote group cohesion. Following this activity, improvisation games and activities were introduced with the goal of promoting the following skills: assertiveness, acceptance, problem-solving, co-operation, non-verbal communication, mindfulness, and memory (see Table 1).

Procedures

 Participants who attended at least three sessions were invited to complete a semi-structured qualitative interview (see Table 2) and were reimbursed with a $25 gift card. This study was approved by the Hamilton Integrated Research Ethics Board.

Measure

 Participants completed a Subjective Units of Distress Scale (SUDS) scale in the form of a thermometer (Kendall et al. 2005; Benjamin et al. 2010) at the beginning and end of each session. The SUDS is a self-report Likert-scale often used within exposure therapies (Benjamin 2010), and is one dependent variable that captures the participants' anxiety, distress or fear before and after the intervention. In this instance, it is a proxy for their subjective social anxiety given that the improvisation intervention is a social situation. Participants were asked to indicate their level of distress, anxiety, and fear within a range of 0–100, with measurements from "totally relaxed" to "highest distress/fear/anxiety/discomfort you have ever felt." Statistical analyses were completed to assess changes in scores from the beginning to the end of each session. All qualitative interviews were recorded and transcribed.

Hypothesis

We predicted that participants would show decreases in anxiety, fear, and distress through participation in the improvisation group.

RESULTS

A total of eight participants were interviewed. Everyone who was invited for an interview attended. From the interviews, four distinct themes were derived: challenging anxiety, community, life skills, and general positive impacts.

Challenging Anxiety

Participants noted a general sense of anxiety and feelings of discomfort when beginning improv. There was recurring mention of not feeling naturally adept at improv, as well as fear of judgment for being too awkward or saying something "stupid." In light of this initial worry, participants described their efforts to challenge this feeling and persevere in spite of their fear. Several participants noted that the anxiety engendered by improvisation gradually alleviated as they persevered: "It was nerve-wracking the first couple of weeks 'cause I'd never done improv before, so I thought everyone was gonna judge me. But no one judges you."

Community

The non-judgemental environment of the improvisation sessions contributed to a sense of community, supportiveness, and increased comfortability. As one participant stated, "You don't have to be good, [...] as long as [...] words are coming out of your mouth [...], then good job." The supportive environment helped participants challenge their anxiety: "I noticed with some of the new people that would show up, I could kind of see the light bulb going off when they'd realize that they were accepted. That [...] if you stuttered then so what?" Most participants noted a boost in confidence in response to the facilitator who "encourages participation but doesn't criticize you." As one participant noted, "[The facilitator] was like, 'You did so good! You have this hidden talent,' and then I was like, 'Yeah I'm hooked.'"

Positive social interactions with peers also contributed to the sense of community. Participants frequently mentioned enjoying getting to know people through the improvisation sessions. There was a noted sense of belonging: "we're all going through something... which I find helps with being close to each other." However, some expressed difficulty improvising with some individuals, stating, "Coming out of my shell is difficult, so when there's people that I feel are gonna overpower me then it was harder." Such statements convey the impact of group dynamics on the participants' ability to engage in improvisation, as some participants were louder than others.
Life Skills

The improvisation sessions helped participants practice skills that could be applicable in real-life situations. Participants learned to accept unpredictability and vulnerability and become more comfortable with their own quick-thinking skills in the improvisation sessions while finding these skills useful in social situations outside of the improvisation sessions. Some participants mentioned that it was easier to engage in genuine self-expression after implementing this through improv, stating, "I've started to open up to other people because with improv, you kind of just reveal whatever's inside your head on the fly." Furthermore, participants discussed being able to freely express themselves: "Yeah, it was just like a safe space. You could do what you wanted to do or felt like you were comfortable doing."

General Positive Impact

Improvisation had a general positive impact on participants. Many participants experienced improved mood in both the short and long term. As one participant articulated, "[Improv] gives you like dopamine in your brain kinda, so like a good feeling," while another stated, "I hate Mondays, […] but I found that [improv] actually helped me look forward to Mondays. […] I felt like it has helped my mood, [I was] looking forward to doing improv […]." Moreover, participating in improvisation sessions was an opportunity for participants to avoid isolation and boredom. One participant said, "On certain weeks, the improv group would have been my only time that I would go out and socialize with people, so I think the big thing is that the improv group […] encourages me to do more of that." Improvisation sessions were also frequently mentioned as a distraction from stressors: "[I'm] enjoying something instead of worrying about what I'm gonna do tomorrow, or what I did yesterday."

Quantitative Findings

Subjective Units of Distress ratings (SUDS) were collected for seven participants who attended 3 or more sessions. The scale ranged from 0–100, and on average, participants' distress scores decreased by 14.81 units (SD = 19.34) from the beginning to the end of each session, and was statistically significant (t = 2.03, p <.05). This finding corresponds with the acquired qualitative data, indicating that participants felt more comfortable by the end of each improvisation session.

DISCUSSION

The current study found a general positive impact of improvisation on anxiety and improvement in overall mood. Sheesley et al. (2016) described comedic improvisation therapy as a "novel pathway to recovery" as it uses group cohesiveness, play, exposure, and humour, all of which are important in dealing with anxiety. Participants reported that the connection they felt in the improvisation group supported a decrease in nervousness and the use of laughter boosted their mood. Participants noted that consistent engagement in improvisation games was associated with a decrease in anxiety, which was consistent with the decrease in SUDS ratings. The reduction of SUDS levels within each improvisation session corroborates the effectiveness of this intervention, since the purpose of general exposure therapy for anxiety is to help individuals gradually face fears over time. The goal is to reduce avoidance and increase psychological flexibility, which is aligned with the goals of improvisation therapy. Participants also noted that the comfort they felt in the supportive environment of the group was a contributing factor to their ability to challenge their anxiety. Furthermore, the lack of negative judgement from others allowed participants to feel comfortable in the sessions. Because of this, they were able to challenge themselves beyond their comfort zone. The combination of comfortability and challenge that all participants expressed having experienced allowed for a degree of challenge that was not unbearable, but rather conducive to personal growth.

The benefits of practices similar to improvisation are not limited to decreased symptoms of mental illnesses. Improvisation has also been shown to promote a variety of valuable skills that are applicable to daily life and general wellbeing (Bermant 2013). As participants mentioned, they developed transferable skills such as conflict management and quick thinking. Creativity is activated during improvisation through individuals' varying responses to scenarios, which Jacob L. Moreno, a psychiatrist and the founder of Psychodrama—a form of psychotherapy in which patients act out events from their past—believed could help in discovering new solutions to difficult situations and finding alternative ways to manage and identify with problems (Akinsola 2013).

Participants of the current study identified several situations during which they were able to apply improvisation skills to real-life situations; for example, one participant stated having become more capable of finding humour in situations that would have previously caused anger. Other skills that were fostered through improvisation included being able to accept uncertainty, adjusting to change, seeing a situation from different perspectives, and being more authentic in self-expression. Improvisation sessions provided a space where communication with others was encouraged when conflicts arose, and where individuals could learn from working through stressful situations.

Overall, participants noted a general positive impact of improvisation on their wellbeing. The consistency of the sessions also provided routine and behavioural activation. These sessions provided participants with an opportunity for spontaneity and excitement as they pushed themselves to try new things. Even though participants noted the difficulty of playing certain improvisation games, at the end, they found it enjoyable and beneficial when they challenged themselves. Notably, although some participants were hesitant to participant initially, they continued to attend the sessions.

CONCLUSION AND IMPLICATIONS
This preliminary study found an overall positive impact of improvisation sessions in terms of a decrease in anxiety symptoms and an improvement in mood. Furthermore, the improvisation sessions provided a sense of community and belongingness causing participants to feel safe to challenge themselves with the goal of developing positive interpersonal skills and decreasing isolation. One of the common sentiments echoed by the participants was that the space was accepting. While group dynamics and positive facilitation played a role in the sense of community, the improvisation sessions allowed for participants to make mistakes, while still being accepted in the community. Additionally, the qualitative data revealed that participants found the improvisation skills useful in their daily life, which increased their functioning in terms of behavioural activation (i.e., engagement in enjoyable activities) and improvement of multiple life skills, including problem-solving, communication, and conflict resolution. The data also reveal that the community and the safe space served as a foundation for the positive benefits of the improvisation sessions. Improvisation is about ensemble-building and developing a troupe that has interdependence on one another. That said, improvisation is more than just a supportive network, as members have a shared interested in co-creating. As a result, an improvisation scene is built, which would not happen without the trust and interdependence that has been fostered within the group.

Participants were encouraged to join the group without having any prior experience or skill, and the improvisation games allowed participants to experiment with different mental states and explore various perspectives. The mental state while participating in spontaneous acting activates the part of the brain responsible for self-expression and decreases activation in the part of the brain responsible for self-monitoring. When participants were able to play and act in an uninhibited manner, they could put down their guards. Improvisation encouraged participants to express what they felt in the moment. Moreover, the pace of improvisation leaves little time or inclination to worry about the self. When participants showed up with a mindset of curiosity, they were able to externalize the symptoms they were experiencing and let go.

This study supports improvisation therapy as an effective intervention that reduces anxiety symptoms and enhances overall mood. Hence, as a complementary intervention, improvisation therapy may provide added benefits to traditional, evidence-based anxiety intervention. Improvisation combines fear and excitement in a supportive environment. This can be compared to the use of exposure therapy in CBT interventions. Exposure therapy activates the structures in the brain associated with fear and provides new information about the feared stimulus (McGuire et al., 2014). The new information serves as evidence that disproves the unrealistic thoughts about the feared stimulus (McGuire et al., 2014). Partnered with relaxation strategies and distress tolerance skills, exposure therapy is an effective intervention for decreasing anxiety (Kraemer et al., 2016). Similarly, improvisation provided a space for the participants of the current study to address their fear about improvisation and its unpredictable nature in a context that was encouraging and non-judgemental (Tobon et al., 2020; Wang et al., 2020).

Given the research in support of alternative treatments for SAD (Lipsitz & Marshall, 2001), it was important to examine the effects of improvisation on SAD and distress. Improvisation may prove to be an effective treatment for young adults as a supplementary intervention or an alternative intervention to traditional anxiety treatments. For example, some people may feel potentially uninterested, may be unable to engage in psychotherapy, or may feel uncomfortable using medications to treat SAD (Steitzer, 2011). This pilot study provided preliminary evidence for the positive impact of the improvisation group on anxiety and mood in an emerging adult population.

ABBREVIATIONS

Abbreviation	Full Form
CBT	Cognitive Behaviour Therapy
GCBT	Group Cognitive Behaviour Therapy
SUDS	Subjective Units of Distress Scale
YWC	Youth Wellness Centre

KEY WORDS
Improvisation; social anxiety; youth mental health; drama therapy

ACKNOWLEDEGMENTS

Table 1

Weekly syllabus

SESSION TOPIC	SESSION DESCRIPTION
Week 1: Improvising Basics	While learning the building blocks of improv, this first "get to know you" class builds confidence through ensemble energy. The class explores the inherent positivity and collaborative nature of improv.
Week 2: Improvising Scenes	A study of emotion, relationship, point-of-view, and environment; this class focuses on what makes an improvised scene work.
Week 3: Diversity	An exploration of characters, ethnicities, ages, and genders based on simple, but extremely fun improvisation exercises.
Week 4: Failure is Fun	Tina Fey's quote about improvisation is apt, "There are no failures, just revelations." We learn to accept failure as a part of our scene work (and life, school, and work) through positive side coaching and resiliency building.
Week 5: Improvising Games and Advancing Scene Work	While continuing an enhancement of improvisational scene work, this class explores improvising short-form games.
Week 6: Status Work in a Scene	This class resonates with many as it illuminates our everyday communication. Often our body language and non-verbals convey strong, but subtle cues that diminish or enhance our status. These are explored in fun games and scene work.
Week 7: Rapid Fire!	A fun, fast paced, think-on-your-feet session that taps spontaneous imagination. A favourite team building workshop at Huffington Post; this class teaches us how to deal with unpredictable situations and continue to build resiliency.
Week 8: Physicality	Much scene work done in silence as we build the physical and emotional world around us. Connection, commitment, and true organic improvisation building.
Week 9: Resiliency Training	A call-back to earlier class on failure and how we now have learned to bounce back, take the revelation, and build upon it.
Week 10: Relationship building in a scene	Combining status, physicality, and emotional work to create meaningful characters and increase the depth of the scenes. We play Weave, by far the most popular game in my teaching at YWC, Second City, and Staircase Theatre. A woven interview style game that spontaneously builds a character who then is 'woven' into the next character, culminating into a final, impactful scene.
Week 11: Long Form Improv 5.4.3.2.1.	Five entirely unconnected scenes take place in succession based on the five offers. The next wave of scenes will consist of continuations of only four of the previous scenes. The four scenes can be chosen by audience votes, or by random. Those four scenes are done in succession. These scenes can start to generate loose connections between each other. The next wave of three scenes will exclude one of the developing plot lines. This wave of scenes should be quite heavily interconnected. The process of elimination is repeated again, and then two heavily connected scenes are played out. The last scene will tie everything up.
Week 12: Wrap up and Favourite Improv Game Party	A mash-up of different games and scene work. There are fun recollections and memories from the previous 12 weeks and I *call-back* scenes, characters, and hilarious moments. We share favourite moments and build a visual wall.

Table 2

Semi-structured interview guide

1	How would you describe your experience in the improvisation group?
2	What did you like about the group? What did you not like?
3	Can you tell us about one memory throughout the program?
4	Can you think of a time during the program that you felt stress? If yes, can you tell me about that experience? What did you do to cope with that feeling? Did anything or anyone help?
5	What was your experience interacting with other members of the group?
6	What were some of your feelings approaching your first session? Did you feel any differently after the session? If yes, can you describe?
7	Have you noticed any changes in your mood since participating in this group? Please explain?
8	Do you feel the group was helpful? If so, in what ways?
9	Do you feel that you have learned any skills to cope with anxiety and stress throughout this group?
10	Would you recommend this group to a friend? Give your reasons.

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BEHAVIOURAL CORRELATES OF LYING

BY: ARIANNA DAVIDS

Canada's Big Little Lies: The Repercussions of Relying on Lie Detection in Court

In the Canadian court of law, defendants swear to tell the truth, the whole truth, and nothing but the truth (Canada Justice Laws, 2021). However, honesty is less common in our day-to-day interactions. Researchers have shown that humans lie frequently (Feldman, 2002). In a 10-minute conversation, Feldman (2002) demonstrated that the average person tells two to three lies, with some people telling upwards of 10 lies. The potential harm associated with lying highlights the need for accurate lie detection. Since people encounter deception often, many people believe they can accurately detect lies (DePaulo & Pfeifer, 1986). However, people perform poorly when asked to detect lies; deception judgements are no more accurate than chance (Bond & DePaulo, 2006), indicating that people struggle to detect lies.

People experience subtle physiological changes when they lie (Langleben & Moriarty, 2013). Certain areas of the brain become more active when telling lies, and this increased activation of certain brain areas results in physiological changes—such as increases in galvanic skin response, heart rate, blood pressure, and respiration (Langleben & Moriarty, 2013). To the liar, these changes feel apparent: lying can make a person flushed, shaky, and nervous. As apparent as these changes may feel to the liar, observers have difficulty detecting these physiological changes (Elaad, 2003). An observer cannot see many physiological changes with the naked eye, so they rely on technologies, such as the polygraph machine, to aid in lie detection. The Federal Bureau of Investigations (FBI) routinely uses polygraph tests to detect lies during criminal investigations and for employment screening (Wolpe, Foster, & Langleben, 2005). People have difficulty directly detecting physiological changes associated with lying without the assistance of a machine.

People believe behaviour reflects physiological changes associated with lying (DePaulo et al., 2003). Loy et al. (2018) demonstrated that without technology to directly measure physiological changes, people rely on observable cues to detect lies. These authors found that fidgeting, gaze aversion, and slow speech are commonly used as indicators of lying as it is incorrectly assumed that these behaviours arise as a result of the physiological changes associated with lying. Even professionals interested in detecting lies, such as police officers and judges, believe that behaviour indicates lying (Elaad, 2003). This commonly held belief is incorrect; minor physiological changes do not affect everyone's behaviour in the same way (Akehurst et al. 2003). For instance, some individuals avert their gaze when lying, while others maintain strong eye contact. A liar also behaves differently when they tell a trivial lie in comparison to when they tell a significant lie because significant lies elicit greater physiological and behavioural changes (Akehurst et al., 2003). Observing behaviour as an indirect measurement of physiological changes cannot consistently distinguish liars from truth-tellers.

People overestimate their ability to detect lies (Elaad, 2003). The discrepancy between an individual's perceived ability and actual ability occurs because people know when they catch a liar, but they rarely know when a liar has concealed their deceit (DePaulo & Pfeifer, 1986). Given that people only remember instances of successful lie-detection, they believe they can accurately detect lies. Because many people observe behavioural cues when detecting lies, positive feedback regarding their lie-detection strategy strengthens the belief that behaviour accurately distinguishes liars from truth-tellers (Elaad, 2003). Law enforcement officers are especially vulnerable to this reinforcement: they have the highest confidence in their ability to detect lies and hold some of the strongest beliefs that behavioural cues indicate lying (Ekman & O'Sullivan, 1991). However, they perform no better than the general population when asked to detect lies. Society relies on law enforcement to make accurate deception judgements to catch criminals (Elaad, 2003). When law enforcement makes mistakes, society endures the repercussions.

The justice system mistakenly relies on a person's ability to detect lies (Elaad, 2003). Some stages of the judicial process—such as during interrogations and sentencing—require law enforcement officers to use discretion when judging a defendant's guilt (Kleinberg et al., 2018). These deception judgements, often based on the defendant's behaviour, can impact jail-or-release decisions. An overreliance on behavioural cues during sentencing can result in wrongly jailing or releasing individuals since behaviour does not systematically relate to lying. Overconfidence in an individual's ability to detect lies exacerbates the issue of incorrect sentencing because law enforcement will continue to believe that their reliance on behaviour is unlikely to result in errors. When a person's freedom is on the line, people need to look beyond behaviour to distinguish lies from the truth.

Everyone lies. But lies can have far-reaching consequences, and our inability to detect lies means that these lies often go undetected (Bond & DePaulo, 2006) While deception-detection may not be imperative in our day-to-day lives, we trust officials, such as police officers, to have an increased accuracy when it comes to detecting significant lies (Ekman & O'Sullivan, 1991). Though more confident in their ability to detect lies, police officers and other professionals are no better than the average person at detecting deception. This increased confidence also seeps into other areas of the justice system, with police judgement considered during sentencing (Pozzulo et al., 2018). As a result, guilty individuals may be released and innocent individuals may be wrongly convicted (Kleinberg et al., 2018). The false assumptions that underlie behaviour-based deception-detection thus have the power to destroy lives. If we aim for objective truth within a court of law, then behaviour-based deception-detection has no place in the justice system.

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GAMBLING DISORDER: THE FIRST BEHAVIOURAL ADDICTION

BY: MARIA PRICOP

Introduction

In psychology, the Diagnostic and Statistical Manual (DSM) is the gold standard for diagnosing mental illnesses. The most recent fifth edition has seen the legitimization of behavioural addictions emerge via the pioneering recognition of gambling disorder. Although pathological gambling has long been acknowledged as an illness, it has made the subtle yet important change from being categorized as an impulse control disorder to being recognized as an addictive disorder. Gambling disorder (GD) involves a behavioural pattern of gambling that causes psychiatric, financial, social and/or occupational impairment (Vaddiparti & Cottler, 2017). Research in the fields of psychiatry, neuroscience, and psychology has illuminated the dangerous shift of impulsion to compulsion that accompanies gambling disorder. The reclassification of GD has led to revolutionary research surrounding its neurological underpinnings and holds vast implications for the future of both its treatment and the entirety of psychiatric diagnosis.

Impulses are automatic desires to perform an action—those moments when people are driven to try a drug or activity for pleasure (Flaudias et al., 2019). Every addiction begins with an impulsive action (Flaudias et al., 2019). Pleasure-seeking turns pathological when the regularization of these impulses eventually leads to continuous engagement, even in the face of turmoil (Flaudias et al., 2019). Individuals engage in compulsive behaviours to fulfill a psychological need—a dangerous habit which takes over daily life and which most know they would fare much better without (Flaudias et al., 2019). Substance addictions are more familiar in this regard. They include the drug someone wanted to 'try just once', or the pills that began as a temporary cure for insomnia and evolved into a detrimental lifestyle. Substance abuse disorders have been thoroughly investigated over the past few decades, from cocaine to alcohol to opiates. The neurobiological underpinnings of addiction are complex, encompassing both behavioural reinforcement and drug–brain interactions—intertwined with genetic diversity—which complicates matters on all levels (Volkow et al., 2016). Conversely, behavioural addictions such as GD provide a unique look at the mechanism of addiction while controlling for drug–brain interactions. Understanding the nuanced differences between GD and substance abuse disorders is a developing topic and comparisons of data have shed light on some of the striking commonalities.

Biological Underpinnings of GD

Several parallels have been drawn between substance abuse disorders and GD, most notably the involvement of the dopaminergic reward system and blunting of striatal activity. The commonality between all substance addictions is the increase of the neurotransmitter dopamine in the brain as a result of drug use. Dopamine is often misconceived to be released upon receiving a rewarding stimulus, though its involvement is more prominent in the anticipation of a reward. This is the reason for which addicts often maintain rituals around drug use, such as taking the drug (or gambling!) at the same time of day, in the same room, using the same ritual to set up its administration, etc. It is also the reason for which methadone administration in rehabilitation facilities comes in the form of a topical patch — this does not produce an excitatory association for the patient. In GD, however, this dopaminergic response is not well understood at the microscopic level despite the plentiful evidence supporting its involvement. It has been suggested, for instance, that the distinction between dopaminergic responses happening after a reward (i.e. reward response) and those happening before a reward (i.e. reward anticipation) may be the key to understanding dopaminergic dysfunction in GD (Linnet, 2014). Another commonality which is well described is the blunted activation of the striatum when anticipating a reward (Potenza, 2013). With prolonged addiction, the monetary rewards which normally contribute to a spike in dopamine become less potent. People feel the need to bet more money in order to achieve the same level of excitement they felt when first beginning to gamble, leading to a cruel cycle of reinforcement. One thing remains clear: gambling is ultimately the anticipation of a reward combined with monetary gains and losses (Potenza, 2013). Slots, for instance, are randomized and therefore lead to the logical fallacy that one is statistically more likely to win in the following game (Brooks et al., 2020). This drives people to 'chase their losses' and ultimately lose money when the chase inevitably fails (Brooks et al., 2020). While more research remains to be done on the neurological underpinnings of this addiction, numerous research studies support the macroscopic neuroplastic changes which take place in the brain.

The unexpected reward and loss experience when gambling leads to stimulation of dopaminergic synapses (Pettorruso et al., 2019). With prolonged addiction, these synapses are hypothesized to reorganize to promote the sustenance of GD (Pettorruso et al., 2019). Synapses associated with the excitatory response produce a stronger effect, whilst those associated with gambling aversion produce a weaker response (Pettorruso et al., 2019). Over time, parts of the brain associated with reward processing—such as the mesocorticolimbic pathway—rewire in a predictable pattern. In functional magnetic resonance imaging (fMRI) studies, similar rewiring occurs in people with drug addictions and gambling disorder (Navas et al., 2019). The strengthening of reward pathways associated with gambling leads from the impulsion of unwinding at the casino monthly to the compulsion that damages lives. Cue-reactivity studies have also shown that this shift from impulsion to compulsion is produced by a large and distributed brain system, rather than a localized area (van Holst et al., 2012). Cue-reactivity literature suggests that cues associated with gambling sensitize the impulsive system of the brain, producing a greater desire to approach addiction-related stimuli (Moccia et al., 2017). Cues also influence the executive control system by diverting attentional resources towards goals related to gambling participation, thereby reweighing the mental balance between acquiring regular stimuli (e.g. food, sex) and gambling or substances (Moccia et al., 2017). By diverting the attentional system towards addictive behaviours and simultaneously making the brain more sensitive to cues which encourage participation, these factors exponentially increase the difficulty of recovery.

Impacts of GD and Comorbid Psychopathology
Gambling disorder profoundly impacts those it afflicts and, compounded with the nuanced neurobiological markers of addiction, finding an appropriate treatment has been tedious. GD is associated with a prevalence of psychological comorbidity, suicide, social isolation, and homelessness (Rash & Petry, 2016).

There exists much evidence that many psychiatric conditions are risk factors for developing GD, especially personality disorders (Rogier et al., 2020). In systematic reviews and meta-analyses of comorbidity of personality and gambling disorders, a 29% prevalence of antisocial personality disorder (Lorains et al., 2011) and a 43% prevalence of any personality disorder was found in sufferers of GD (Pietrzak et al., 2007). An analysis of more than 43,000 people conducted by Desai and Potenza (2008) found that the likelihood of meeting the diagnostic criteria for personality disorders increased with the number of gambling problems. While personality pathology has not been shown to increase the odds of GD, personality profiles marked by a combination of negative affectivity and low behavioural inhibition are present in people with GD (Vaddiparti & Cottler, 2017). A wealth of data point to a common genetic risk factor for both GD and substance abuse disorders (Sacco et al., 2008). One study found that in 65% of all cases, people with GD developed alcoholism within two years of symptom onset (Slutske et al., 2000). Dysphoric disorders such as Major Depressive Disorder are associated with GD and may be a precursor to gambling (Clarke, 2006). Gambling can facilitate the temporary avoidance of dysphoria via the dopaminergic pleasure response previously discussed and therefore become a dangerous escape from pre-existing psychological conditions (Clarke, 2006). In extreme cases, people may gamble away their livelihood to the point of homelessness while simultaneously destroying interpersonal relationships (Rash & Petry, 2016). This may occur, for instance, by borrowing money and not paying it back, or by lying to loved ones and damaging trust. Social isolation can lead to an internalization of the world and withdrawal from society, as well as feelings of shame and regret, thereby increasing the risk for depression and suicide (Trout, 1980). Of note, causality is difficult to determine, as it is unclear whether the personality traits of people with GD or the disorder itself leads to the development of comorbid disorders (Parhami et al., 2014).

Treatment
The reclassification of GD as an addictive disorder has additionally had vast implications for its treatment and prevention. Treatment of GD is in its infancy, as researchers clamour to tailor treatments specific to this non-substance addiction. The current model used in clinical settings is based on the general treatment methods used in other addictions (Snippe et al., 2019). While the data have shown that GD shares several similarities with substance addictions, nuanced differences which are not yet well understood combined with personal variation in the motivation to gamble complicate effective treatment (Moccia et al., 2017). Further, reaching individuals with GD is a challenge unto itself as only 10% of problem gamblers ever seek help for their addiction (Cunningham, 2005; Suurvali et al., 2008). These efforts have been in large part impeded by the ease with which gambling platforms can now be accessed online (Snippe et al., 2019). While addictive substances require an active seeking process, gambling can be accomplished from home. This poses a major obstacle to patients—especially if their initial habit was fulfilled online—as merely being at home or seeing a laptop can spark an intense desire to participate in gambling (Snippe et al., 2019).
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Behavioural therapy has been a popular proposition and has shown some promise in the form of motivational interviewing and cognitive behavioural therapy (CBT). A recent study done by Jiménez-Murcia et al. (2019) combined the interpersonal factors contributing to GD with treatment outcome. The study employed a CBT only control group and a CBT treatment group in which participants had a concerned significant other participating in their treatment. A statistically significant improvement in treatment outcomes was found for those with an involved significant other, regardless of whether it was a romantic partner. Patients were more likely to attend therapy sessions, less at risk for dropping out of therapy, and demonstrated improved treatment retention. The authors suggest that the specific ways in which significant others interacted or managed situations related to GD were responsible for the observed results and may therefore hold great potential in improving treatment outcomes (Jiménez-Murcia et al., 2017).

While CBT has been the most popular approach to treatment so far, other behavioural therapies have shown promise, including mindfulness-based interventions (MBI) (Snippe et al., 2019). This group of approaches combines the CBT methods of controlling and modifying cognition with mindfulness practice centered on increasing awareness and acceptance of oneself (Van Gordon, 2013). Mindfulness has been shown to be inversely related to cue reactivity, gambling severity, and psychological distress (Lakey et al., 2007; de Lisle et al., 2014; McKeith et al., 2017). Due to the high impulsivity and emotional dysregulation observed in patients with GD, mindfulness can help by increasing the amount of time people have between feeling an urge to gamble and engaging in gambling (de Lisle et al., 2014). This increases the likelihood that patients will ensure their actions match their goals, and therefore the likelihood that they will abstain (de Lisle et al., 2014). One study found that 83% of participants abstained from gambling more than 3 months after treatment, though it did not employ a control group and should be interpreted with caution (Christensen et al., 2013). While CBT, mindfulness, and supportive relationships have shown promising preliminary results, many approaches have yet to be developed.

Current research has focused on the mechanisms of behavioural addiction in the context of reducing the sensitivity to cues and the attentional diversion previously discussed (Potenza, 2019). Implementation of attentional methods has shown a 13% lower alcoholism relapse rate one year after treatment completion compared to control and sham treatments (Wiers et al., 2011). For example, approach bias modification trains participants to either approach or avoid cues related to their addiction (Snippe et al., 2019). No approach bias modification treatments have been implemented thus far for gambling disorder, though attempts are ongoing (Snippe et al., 2019). Numerous other treatment methods have been proposed for the treatment of GD, including evaluative conditioning, working memory training, selective inhibition training, and digital interventions (Snippe et al., 2019). Many of the proposed models, unfortunately, have not been implemented and development is underway for finding an effective treatment for GD (Snippe et al., 2019).

Conclusion

Much remains to be uncovered about GD, though its reclassification as the first behavioural addiction published in the DSM sets a precedent for the addition of other behavioural addictions. Gaming addiction, food addiction, sex addiction, and many others have seen a recent push from the psychiatric community to enter the publication (Grant et al., 2010). Classifying disorders allows researchers to understand their mechanisms, develop methods for treatment and prevention, and increases the attention these disorders receive from researchers. Gambling disorder is not only an exciting frontier to conquer, but also inspires remarkable developments larger than itself.

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THE EFFECT OF STRESS AND STRESS SUSCEPTIBILITY ON DRIVING PERFORMANCE

BY: SEYEDEH PARIA JAHANBAKHSH

Introduction

 Although road crashes happen for multiple reasons, it is largely believed that human factors are one of the most relevant elements in their causation (Palat et al., 2019). One of these human factors is stress, which is often defined as the body's response to any demand that exceeds individuals' adaptive capacity (Ge et al., 2014). Stress has been shown to affect attention, working memory, and perceptual-motor performance, all of which are cognitive processes needed for safe driving (Ge et al., 2014). Stress, therefore, appears to predispose drivers to a higher risk of automobile accidents but can also significantly impact dangerous driving behaviour (Matthews et al., 1998). A 1969 study estimated that drivers who have experienced a recent stressful life event are five times more likely to cause fatal accidents (Brenner & Seltzer, 1969).

 This article aims to review the scientific exploration of stress' effects on driving. These impacts have been studied using three primary methods: (i) exploring personality measures related to stress susceptibility, (ii) investigating the relationship between stressful life events and reckless or negligent driving behaviour, and (iii) examining the effect of traffic conditions and environmental stressors on driving. Numerous studies have also focused on the interactions between these personality, personal experience, and environmental contributors.

The Effects of Stress Susceptibility on Driving Behaviour

 There are pronounced individual differences amongst drivers in their vulnerability to stress. The Driving Behaviour Inventory (DBI) is a multifactorial questionnaire that measures the different dimensions of driver stress and has five distinct—yet modestly intercorrelated—subscales. A study of 510 Japanese drivers showed that several of the DBI subscales predicted accident involvement and convictions for driving offences (Matthews et al., 2010). The three primary subscales influencing erroneous or risky driving were aggression, dislike of driving, and alertness. Aggression items on the DBI concern driving reactions of irritation, impatience, and behavioural aggression (particularly when the drivers' progress is impeded by other traffic) (Matthews et al., 2010). Answers to dislike items reflected feelings of unhappiness, anxiety, and lack of confidence, particularly when driving conditions were difficult. Alertness items denote active monitoring of the environment for potential hazards (Matthews et al., 2010).

A 1998 study by Matthews et al. found that high scores on each of these DBI subscales were correlated with different driving behaviours, which varied by context. They had 298 participants perform three tasks in a driving simulator: (i) an open-road driving task (where participants performed an additional pedestrian detection task), (ii) a car following task, and (iii) an overtaking task. Drivers that scored high on the aggression scale were more likely to commit both more frequent and more dangerous overtakes., The danger of overtaking was calculated

using the speed of the simulated car being overtaken and the participant's distance from it. Habitual dislike of driving was associated with reduced control skills in the open-road and car-following tasks. This means these drivers had more lateral positional variability and less stability in their distance between them and the car they were told to follow. High scores on the alertness measure predicted increased speed of pedestrian detection in the open-road condition. However, pedestrian detection was not tested in any other condition making it difficult to assess how other dimensions of driver stress may impact this task.

As such, a more recent study by Chai & Zhao (2016) investigated the impact of the aggression subscale on pedestrian detection. In this study, 50 participants completed the DBI, and then engaged in a simulated driving task in two different conditions, non-provoked & provoked, respectively. In the non-provoked condition, there were no events in the simulation that could be considered aggravating, whereas in the provoked condition, the participants experienced 6 sustained horn honking and 6 improper car passings during the simulation. In both conditions, 4 target pedestrians were displayed from either the left or right roadway edge line. The researchers found that the aggression subscale on the DBI was associated with a lower likelihood to give way to pedestrians, and aggressive drivers drove closer to the pedestrians in the provoked condition.

The authors in the 1998 Matthews et al. study proposed that each dimension of stress susceptibility may affect driving performance under unique circumstances by promoting different coping strategies. Aggressive drivers, for instance, may use more confrontive coping strategies due to their negative appraisal of other drivers and pedestrians. In contrast, those who dislike driving may exhibit negative self-appraisal, which leads to anxiety and emotion-focused coping when driving. Drivers high in alertness, however, would develop strategies for hazard detection and tend to use the task-oriented coping style. A recent study conducted in Iran investigated the relationship between different coping styles and driving behaviour. The results revealed that drivers who employ the emotion-oriented coping style are more susceptible to crashes when compared with those who used other coping strategies (Lotfi et al., 2017).

The effect of personality on driving behaviour, however, is not limited to coping styles. A study by Ge et al. (2014) found that individual personality traits mediate the effect of stress on driving. Drivers (n=242) completed questionnaires regarding perceived stress, driving behaviour, and personality trait scales related to sensation-seeking, anger, and altruism. They found that anger was positively correlated with emotional, aggressive, and risky driving, and data analysis indicated that anger mediated the relationship between stress and risky driving behaviour (Ge et al., 2014). Therefore, a number of studies associate different personality traits related to stress susceptibility to driving behaviour in different situations, such as car following and pedestrian interactions.

The Impact of Traffic Conditions and Environmental Factors on Driving Stress & Speed Control
Although, no single environmental factor will necessarily be interpreted as stressful by everyone, some factors have been shown to frequently lead to stress (Hennessy et al., 2000). One of the most common contributors to driver stress is traffic congestion as it tends to slow or block goal attainment (Hennessy et al., 2000). Gulian et al. (1989) found that half of highway drivers in the United Kingdom experience irritation in traffic congestion regardless of time demands. A more recent study by Hoseinabadi et al. (2013) found that Iranian urban bus drivers experienced an increase in blood adrenaline on heavy-traffic days.

In the study, 69 bus drivers were tested on 2 distinctive workdays: on weekdays (in rush hours) and during weekends (when the traffic congestion was lower). Blood samples were taken from the drivers and their precision on the Distance Estimation Task was measured when the drivers stopped for a break after one of two trips of the day.

On days that drivers experienced high traffic congestion, they had poorer performance on the distance estimation task and higher levels of blood adrenaline (Hoseinabadi et al., 2013). This suggests that traffic congestion can lead to higher experienced physiological stress, which can subsequently impair the cognitive abilities needed for driving. Complex traffic environments, such as tunnels, are another factor that may increase driver stress and accident rates. Driver attention to important traffic information has been shown to decrease as early as 150 meters prior to reaching a tunnel opening, which may result in lane selection errors upon entrance (Miller & Ng Boyle, 2015). Miller and Ng Boyle (2015) collected data from 50 drivers, including electrocardiogram (ECG) recordings—which measure electrical activity in the heart—as they drove along a route which included two tunnels and three non-tunnel segments, as well as a 75-meter transition period before each tunnel. The data showed that drivers decreased their speed before entering a tunnel and increased their speed just before exiting. Moreover, the highest level of stress, determined by ECG measures of heart rate, was observed along the 75-meters before each tunnel opening, followed by the tunnel segments. These results suggest that tunnels increase driver stress and speeding which are likely contributing to the higher rates of accidents in these environments. Therefore, environmental stressors can have unique effects on drivers' perceived stress levels, and subsequently, their behaviour.

The Effect of Stressful Life Events and Work-Related Stress on Driving Performance

Life stress can result from major life-changing events or the cumulative effect of daily hassles, and has been associated with risky driving behaviour (McMurray, 1970). Marital problems are one of the major life stressors that have been extensively studied in this regard. A 1970 study by McMurray examined the driving records of those who had been involved in divorce proceedings and found that their rate of traffic violations was significantly higher than that of other drivers. Retrospective self-report data have been very useful in this area of research; Lagarde et al. (2004) used these data for a sample of French drivers and found that participants involved in marital separation or divorce were four times as likely as other drivers to cause motor vehicle accidents.

Work-related stress is another factor that can greatly affect driving performance (Carty et al., 1999). This is especially relevant for full-time professional drivers who are exposed to a range of stressors which may elicit behaviours detrimental to their work performance (Carty et al., 1999). A 1999 study explored the psychological predictors of work-related automobile accidents in a sample of Australian transport industry workers and found a significant association between occupational stress and self-reported crash involvement (Carty et al., 1999). The researchers also found that individuals who drive less regularly for work and personal reasons might experience workplace issues that can lead to stress, such as role ambiguity, role conflict, work overload, or interpersonal conflicts. Resultantly, these individuals may experience a range of symptoms, namely fatigue and anxiety, which can affect their driving performance and result in dangerous behaviours (Carty et al., 1999). A potential mechanism for how life stressors affect driving involves the "spillover" effect—whereby driver stress is related to stress in other domains, including work and domestic life (Rowden et al., 2011).

The "spillover" effect can heighten the perceived stress of difficult driving situations, and lead to further impairment of drivers' cognitive abilities. Therefore, when assessing the effect of environmental stress and personality factors on objective driving performance measures, one must consider the relative impact of work and life-related stressors.

The Interactive Approach to Understanding the Effect of Different Stressors on Driving Behaviour
Each of the stress factors mentioned above can negatively impact driving performance, but studies that explore the impact of interactions between these stressors are more ecologically valid, due to the intersection of these factors in real life situations. A study by Hennessy et al. (2000) found that traffic congestion, daily hassles, and trait stress susceptibility all interact and impact state driver stress. The study included 56 participants who drove in low or high traffic congestion areas. Prior to their driving, they completed the DBI, the results of which helped the researchers infer their trait stress susceptibility, and the Survey of Recent Life Experiences, which is a self-report measure of exposure to daily hassles. During their drive, the participants were instructed to call the experimenter at a designated landmark and verbally answer the State Driver Stress Questionnaire, which assesses the state experience of driver stress. Similar to previous research, this study found that state driver stress is greater in high —compared to low—traffic congestion. In addition, they suspected that the state driver stress can be higher due to the interaction of daily hassles and trait driver stress susceptibility in high congestion conditions. Exposure to life hassles increased state driver stress for drivers high in trait stress susceptibility, but contrary to the researchers' hypothesis, exposure reduced state driver stress for those low in trait stress. One possible explanation for this unexpected interaction is that drivers low in trait stress are more adaptive. Self-control and passive responses are adaptive responses to problems that have no effective solution, such as driving in high traffic congestion (Kohn, 1996). Therefore, rather than exerting cognitive energy to try and confront the demands of driving, these drivers may distract themselves by reflecting on their work and life-related problems.

A similar study by Tement et al. (2020) sought to investigate what role the interaction between neuroticism (a personality factor linked to stress susceptibility) and driving demands played in determining driving behaviour. High neuroticism was defined as a higher predisposition to emotional distress in stressful situations. Using a driving simulator, the researchers found that driving behaviour became safer in scenarios that were highly demanding in terms of information processing. They suggested that this result could likely be due to these environments requiring higher levels of alertness. Moreover, individuals high in neuroticism were less capable of adapting their behaviour to higher information processing demands, resulting in more speeding, winding, tailgating, and jerky driving. Therefore, different forms of stress susceptibility may lead to variable interpretations of exogenous stress factors, such as daily hassles and driving stress. Consequently, it is important to gain more insight into these interactions in order to propose fine-grained solutions for reducing driver stress.

Conclusion

This literature review sought to investigate how unique stressors and personality factors can affect driving performance and to explore the proposed mechanisms for the observed impacts. Literature pertaining to drivers' stress susceptibility indicates that personality traits may mediate the relationship between exogenous stressors and driving behaviour by eliciting varying coping mechanisms. Multiple studies have found that emotion-focused coping mechanisms lead to both more erroneous and more dangerous driving which can cause motor vehicle crashes. Other factors such as traffic congestion and driving environments can also significantly influence driving behaviour. This effect may be mediated by stress as suggested by physiological measures of greater perceived stress in high congestion and complex driving environments. Life and work-related stress may also lead to exaggerated or greater perceived stress by drivers, although their combined effects on overt driving behaviours may differ depending on individual stress susceptibility.

Although many studies have investigated the effect of specific stressor and personality traits on overt driving behaviour and perceived driver stress, fewer have explored how stress impacts specific and frequent driving tasks, such as pedestrian detection and lane changing behaviour. Gathering more evidence in this area is pivotal for developing a more thorough and accurate understanding of the mechanisms dictating the impacts of stressors and stress susceptibility on driving performance. These findings can then help us develop countermeasures, on an individual or infrastructural level, that reduce stress's impact on driving behaviour. For example, drivers who score higher on the dislike and aggression subscales of the DBI could use mindfulness techniques that have been shown to reduce our dependence on emotion-oriented coping strategies (Hulsheger et al., 2012). Another possible intervention could be optimizing tunnel designs such that their impact on drivers' stress is reduced, such as incorporating better lighting inside the tunnel (Miller & Ng Boyle, 2015). Therefore, a better understanding of the ways in which stress can impact driving tasks will, in turn, provide guidance for the establishment of more effective interventions to reduce its effects on driving performance.

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THE SHYNESS STRUGGLE

BY: MADELINE ANNE KOMAR

Understanding the Shyness-Sociability Conflict: A Theoretical Case-Study Approach

Eight-year-old Cassidy struggles to interact with others. Cassidy wants to make friends but she fears the other children will dislike her. Cassidy is sociable—she enjoys interacting with others—but she is also shy (Schmidt, 1999). Shyness refers to a personality trait characterized by avoidance, reticence, and nervousness. Shy people tend to be socially withdrawn, either because they are naturally introverted, or because they are socially anxious. While some shy children enjoy solitude, other children find shyness debilitating (Poole & Schmidt, 2018). Being shy makes it harder to be sociable because shy children worry about how others perceive them. Some shy children experience internal conflict (Tang et al., 2017).

Some shy children want to be social. Sociability—the desire to socialize with others—exists independently of shyness. Sociability can be measured using absolute frontal lobe EEG power, which indexes activation levels in the frontal cortex using scalp electrodes (Schmidt, 1999). Left frontal lobe activation corresponds to positive emotions such as joy, while right frontal lobe activation corresponds to negative emotions such as anxiety. Shy individuals have right asymmetric EEG power; individuals show higher right frontal lobe activation, possibly making them more prone to negative affect. Conflicted shy people—shy children who report wanting to engage socially with others—also have right asymmetric EEGs, but exhibit more left frontal activation than non-social shy people (Schmidt, 1999). Just like sociable people, conflicted shy people show left frontal lobe activation, but like non-sociable shy people, their right frontal lobe activation dominates. A conflicted shy child, like Cassidy, would show left and right frontal lobe activation, indicating she is interested in making friends but experiences social anxiety (Schmidt, 1999).

Being social causes anxiety in some shy children. Shy children fear negative judgement. Fear and anxiety responses occur due to activity in the sympathetic nervous system. When a perceived threat is detected, the sympathetic nervous system prepares the body for fight or flight by increasing heart rate (Pool & Schmidt, 2018). Heart rate approximates arousal of the sympathetic nervous system; greater heart rate indicates greater anxiety. Shy children experience anxiety during public speaking. For shy children, public speaking represents an opportunity to be negatively evaluated, similar to social interaction (Schmidt, Fox, Schulkin, & Gold, 1999). Compared to non-shy children, shy children's heart rates increases more in the minutes leading up to a speech (Schmidt, Fox, Schulkin, & Gold, 1999). A shy child like Cassidy perceives the same social situation—a speech task—as more threatening than non-shy children, so Cassidy also engages in more overt anxious behaviors. Overt anxious behaviors, such as hairpulling and fidgeting, contribute to social awkwardness (Schmidt, Fox, Schulkin, & Gold, 1999). Despite wanting to participate socially, Cassidy feels too anxious to even approach other children, and her awkwardness discourages other children from approaching her. Being both shy and isolated make Cassidy a target for bullying (Rubin, Coplan, & Bower, 2009).

Negative social experiences exacerbate the shyness-sociability conflict. Compared to youths whose shyness remained stable or declined, adolescents who become more socially withdrawn over time experience more exclusion in middle school (Booth-LaForce, Kennedy, Rubin, & Rose-Kasnor, 2012). Exclusion increases social anxiety and decreases social competency among shy adolescents (Gazelle & Druhen, 2009, as referenced in Booth-LaForce, Kennedy, Rubin, & Rose-Kasnor, 2012). Consider Cassidy: a shy individual who craves social success but dreads rejection. Bullying intensifies social fears; hence, conflicted shy adolescents struggle to overcome their shyness and anxiety. The shyness-sociability conflict remains unresolved, and shyness often increases into adulthood. People whose shyness increases over time tend to experience more internalizing problems, such as depression, in adulthood (Tang et al., 2017).

Resolving the shyness-sociability conflict would likely contribute to better mental health. Compared to shy individuals who remain isolated, shy people with strong social networks usually have fewer internalizing problems (Frenkel et al., 2015). Having access to a strong peer support system allows shy adolescents to improve their social skills and successfully confront their fears. Positive social engagement, especially in adolescence, helps improve self-efficacy so conflicted shy people experience less social anxiety and can fulfill their desire to socialize (Frenkel et al., 2015). For a child like Cassidy, experiencing social acceptance through a club or sports team contributes to a positive pattern of rewarding social engagement as opposed to a negative pattern of fearful self-isolation. Positive social engagement in adolescence provides the social skills necessary to reduce internal conflict, improving the lives of conflicted shy children who would otherwise struggle.

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THESIS ABSTRACTS
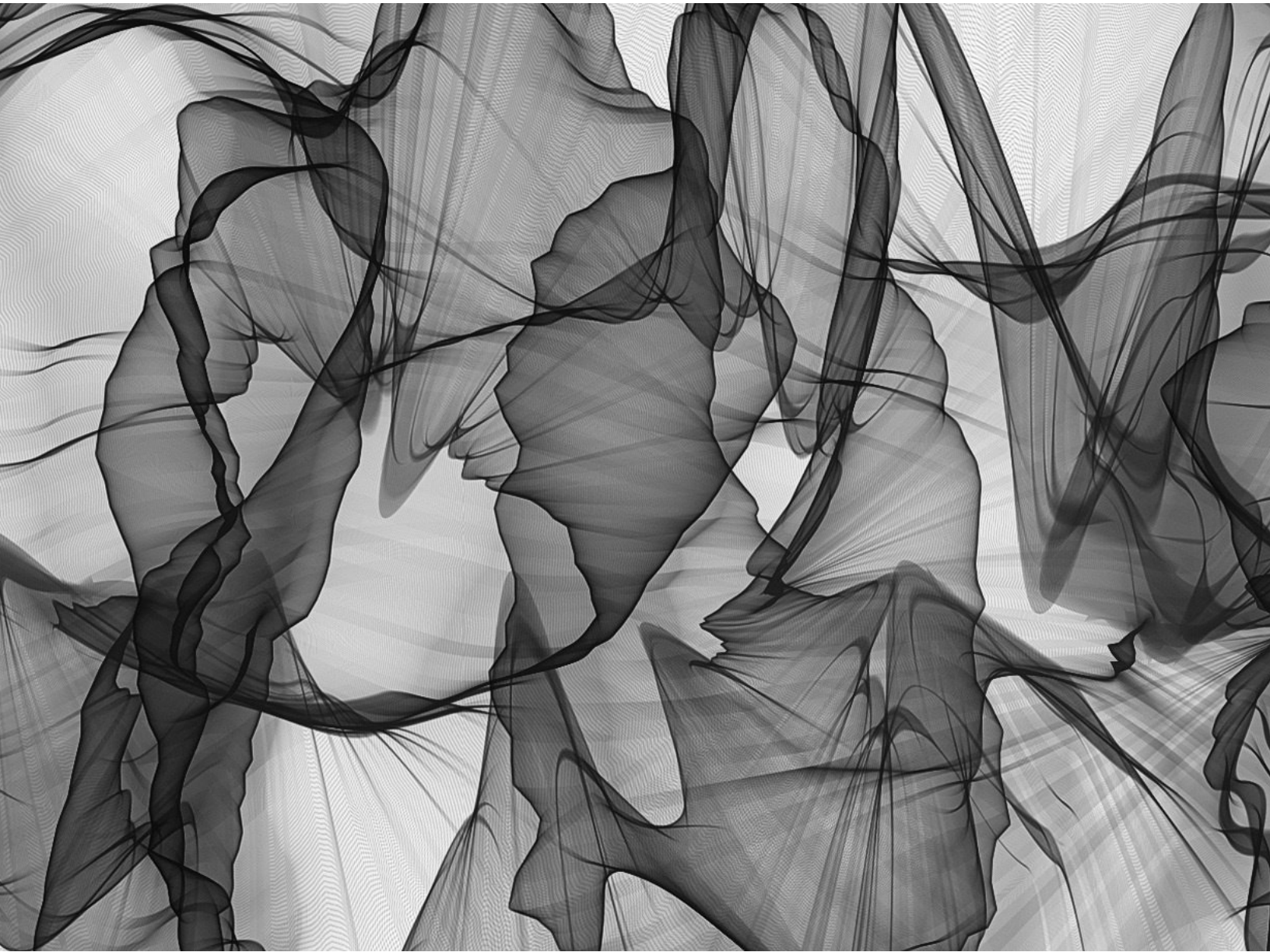
'BACK TO REALITY SERIES PSYCHOEDUCATIONAL VIDEO GAMES FOR INCREASING KNOWLEDGE OF PSYCHOSIS ASSOCIATED WITH MARIJUANA USE

BY: JUSTIN CHIU

Cannabis use in youth is associated with a significant increase in mental health disorders, including psychosis, and there is a significantly greater risk for those who begin to use cannabis at an early age. To address this issue, video game technology shows promise of making youth aware of a variety of mental health disorders, including psychosis. The 'Back to Reality' series is the first Canadian psychoeducational product that uses interactive videogaming to simulate the emotional and perceptual experiences associated with psychosis, including hallucinations, thought disorder, depression, mania, panic attacks, and substance use.

The purpose of this study is to assess the 'Back to Reality' series as a psychoeducational tool to educate undergraduate students about the association between cannabis use and psychosis. The 'Back to Reality' series was compared to the control game, Morpheus' Spell. Twenty McMaster University students aged 17-22 played the 'Back to Reality' series and the control game in a randomized order. After playing each game, the participants completed two multiple choice quizzes related to cannabis use and psychosis. Each quiz had ten questions, with one correct option out of four choices. Participants could score a maximum of ten points for each quiz; mean and standard deviation values were then calculated. The participants also completed a survey that asked for their opinions about gameplay satisfaction after playing each game. Participants indicated whether they felt comfortable playing the games, whether they enjoyed the games, and whether they enjoyed the graphics, music, and stories. The participants were additionally asked if they thought the game was youth-friendly and whether they would recommend it to a friend. Demographic information was collected, including the participants' ages, genders, and frequencies of use of various game platforms.

Participants who first played Morpheus' Spell improved significantly after playing the 'Back to Reality' series on quiz 1 (5.44 ± 1.51 vs. 6.78 ± 1.48, p = 0.03) and quiz 2 (6.67 ± 1.41 vs. 8.22 ± 1.30, p = 0.005). However, this pattern was not observed for participants who first played the 'Back to Reality' series for quiz 1 (6.27 ± 1.19 vs. 6.09 ± 1.14, p = 0.17) or quiz 2 (7.55 ± 1.04 vs. 7.82 ± 0.40, p = 0.28). When asked about their experiences with the games, significantly more participants enjoyed the story of the 'Back to Reality' series compared to Morpheus' Spell (20 vs. 10, p = 0.0003).

Based on the results, the 'Back to Reality' series appears to educate university students about the association between cannabis use and psychosis. Participants also enjoyed playing the 'Back to Reality' series. Future research could involve evaluating the 'Back to Reality' series for use in adolescent populations, including high school students, with the aim of incorporating the 'Back to Reality' series into the high school curriculum.

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RIDGE REGRESSION MODEL FOR PREDICTING ADULT HEIGHT AND VOCAL TRACT LENGTH RELATIONSHIPS

BY: FARNIA KHOSHSOROUR

Formants are the prominent frequency bands that determine a vowel's phonetic qualities. Think of formants as resonance frequencies of the vocal tract, they are usually perceived as the timbre or quality of the voice. Listeners usually associate a low formant and voice pitch with masculinity, and a larger body size (Pisanski et al., 2012). One topic that is currently debated in voice psychology is if speech qualities alone can directly predict speaker height. Lass et al. (1979; 1980) state that formants reliably predict adult human body size within the same sex, while Van Dommelen & Moxness (1995) and Fitch (2000) found this relationship to be weak. There are multiple models that analyze this relationship (Baer, Gore, Gracco, & Nye 1991; Lammant and Naraynan, 2015), but they are limited in their samples's demographic and sizes. This paper aims to address whether a model can accurately predict speaker height from speech signals using a larger sample size than previous studies. Using the Praat application, we isolated spoken vowels and identified their formants. This was run through a ridge regression analysis, which compares predicted values to observed ones. This minimized loss functions to find possible relationships compared to previous models. We analyzed associated variables such as formant dispersion vs height, geometric means vs height, mean formant, formant position, delta f (average formant spacing), and vtl delta f (average formant spacing based on vocal tract length ie. vtl). Our model predicted the relationship between adult height and speech signals (formants) better than previously mentioned studies with an r2 of 0.01949 (females) and r2 of 0.02124 (males). This relationship model has been pursued by many researchers in the voice field. However, seeing as the relationship does not have enough strength, the chances of finding a model that predicts the relationship with high accuracy is slim. It might be better to pursue other relationship models within voice psychology.

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THE EFFICACY OF GROUP COGNITIVE–BEHAVIOURAL THERAPY FOR PERFECTIONISM IN AN ANXIETY DISORDERS SAMPLE

BY: SABA HAJIZADEH

Perfectionism is prevalent across many psychological disorders, and can interfere with successful treatment. In particular, it can interfere with the successful treatment of anxiety disorders (Egan, Wade & Shafran, 2012). Studies have shown that cognitive-behavioural therapy for perfectionism (CBT-P) is effective in treating perfectionism (Shafran, Coughtrey & Kothari, 2016); however, no research has examined the efficacy of group CBT-P in treating anxiety disorders. This study will examine the efficacy of group CBT-P in a sample of individuals with anxiety disorders to determine whether CBT-P significantly reduces symptoms of perfectionism. This study will also ascertain whether CBT-P leads to improvements in anxiety-related symptoms and overall daily functioning. Participants (N = 24) with an existing anxiety disorder were referred to the CBT-P group at the Anxiety Treatment and Research Clinic at St. Joseph's Healthcare. They attended 10 weekly sessions. They completed measures at pre and post-treatment of beliefs about perfectionism, perfectionistic behaviours, self-compassion, symptom severity, and functional impairment. Pre- and post-treatment scores were compared using paired samples t-tests. Participants demonstrated significant reductions in perfectionistic beliefs, $t(23) = 4.31$, $p < .001$, and behaviours, $t(23) = 7.11$, $p < .001$, as well as significant improvements in self-compassion, $t(23) = 2.26$, $p = .03$. Participants also showed marked improvements in symptom severity, $t(23) = 4.55$, $p < .001$, but did not show significant improvements in functional impairment, $t(23) = 1.26$, $p = .22$. These preliminary findings suggest that group CBT-P is an effective therapeutic intervention for reducing perfectionism and overall symptom severity in a targeted anxiety disorders sample. Replication of these results is warranted in larger samples.

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