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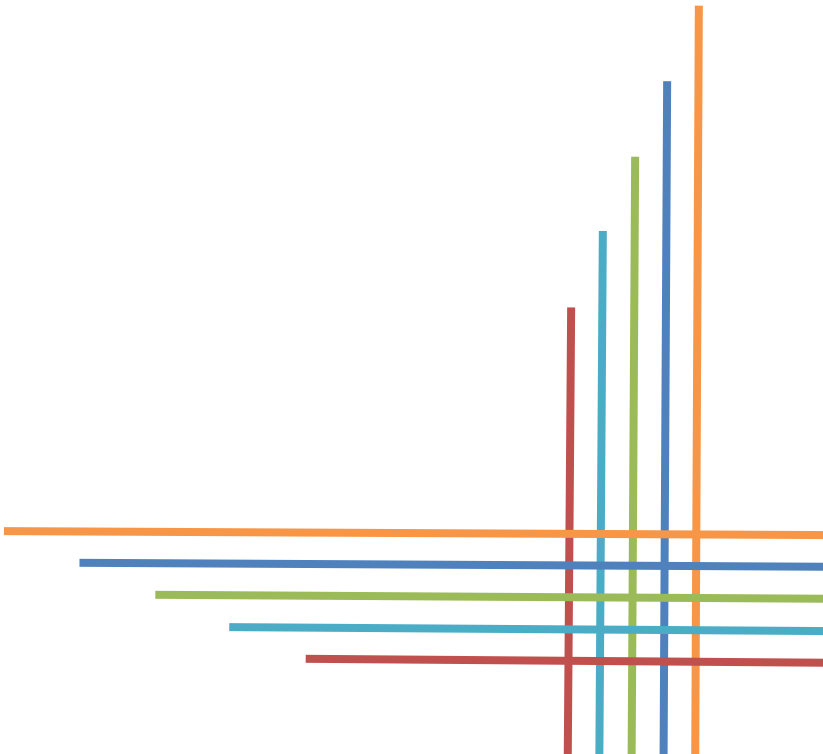

Editor-in-Chief: Derek Zhenxinyu Zhang

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a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

UBC's Undergraduate Journal of Psychology

Volume 3 **August 2014**

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University of British Columbia's Undergraduate Journal of Psychology (UBCUJP) is an annual, student-run, peer-reviewed journal. Our goal is to provide a platform for psychology undergraduates at UBC to showcase their research. We believe that the months of dedicated work our undergraduates devote to their research papers should result in more than a mark for a class and then quickly left behind. Instead, these research papers provide a fantastic opportunity for undergraduates to experience the peer-review and editorial process while also being a valuable resource for faculty members and fellow students to learn about the research happening in our scientific community.

Our focus is three-fold:

1) To undergraduate authors we offer a valuable and rare experience into the peer-review, editorial, and publication process.

2) To our editorial board and reviewers, we offer the opportunity to develop reviewing, critical thinking, leadership and managerial skills that are essential for success in graduate studies and future careers. Being involved with UBCUJP is also a great opportunity to network with faculty members, graduate students and other motivated undergraduates.

3) To graduate students and faculty members, we offer the chance to engage and mentor undergraduate students in greater depth.

We hope the journal itself will offer a unique peek into various developing projects around the research labs of UBC's Department of Psychology.

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Editor's Note:
A Message to the UBC Psychology Community

Dear fellow students, researchers, professors and friends,

When UBCUJP was founded in 2011, I was still a young undergraduate student who just joined the Honours cohort at UBC. Looking back, now I can proudly declare my full awareness of where the honour of research lies. It comes from our devotion to the advancement of existing beliefs, it comes from our dedication to the exploration of new knowledge, and it comes from our inspirations passed on to the community and beyond with our spectacular works.

Dedication, devotion, and inspiration: these are indeed all the amazingness found in this year's production of the UBCUJP. It is my absolute pleasure and profound honour to present its current 2013-2014 Volume. As you turn the page, you will soon realize the power of undergraduate research, from the extensive discussion of gender, stereotypes and their implications for our own world in social psychology, to the intuitive investigation related to perceptive and memory processes in cognitive psychology and behavioural neuroscience.

Despite the researchers and authors' great contribution, this year's UBCUJP would not have been a success without its truly outstanding editorial and executive team. The section editors and reviewers not only completed their assigned tasks in a timely fashion but also lent support to editorial nuances and journal promotional needs. The section editors in every capacity have all demonstrated strong organizational skills and leadership charisma. I would like to thank Nathan Wispinski, Mona Zhu, Stephanie Stoltenberg, Katharina Block for their exceptional excellence and for always being there for me throughout the year.

I also owe the journal's accomplishments to the essential support generously offered by the Department of Psychology at UBC, especially our distinguished faculty advisors—Dr. Michael Souza and Dr. Sunaina Assanand. A department investing all it has to the personal growth and professional development of its own students is second to none, and all the efforts that each and every graduate advisor, mentor, research supervisor and the staff member has devoted to the journal are highly commendable.

Congratulations to all our authors on their achievement, and I sincerely wish UBCUJP all the best in its years to come.

Zhenxinyu Zhang

Derek Zhenxinyu Zhang
Editor-in-Chief
UBCUJP, 2013-2014

The Effect of Acute Low Doses of the CB_1 Receptor Agonist HU-210 on Sexual Behaviour in Male Rats

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Edited by: Christina van den Brink, Department of Psychology, University of British Columbia. Received for review May 1, 2014, and accepted July 31, 2014.

Abstract

Psychoactive substances such as marijuana are known to affect perception, motivation and sexual functioning via the endocannabinoid system and its cannabinoid type 1 receptors (CB_1-R). Previous literature on CB_1-R agonists in human and animal models has inconsistently concluded both facilitation and inhibition of sexual behaviour. Studies on the selective CB_1-R agonist (-)11-hydroxy-Δ8-tetrahydrocannabinol (HU-210) have been limited to dosages from 25-100 µg/kg. We hypothesized that with lower doses, cannabinoid-induced motor deficits would diminish and cease to mask the enhancing effects of heightened motivation, allowing increased sexual behaviour to become visible. The present study investigated the acute effect of HU-210 on sexual behaviour in the male rat. Twenty-nine adult male Sprague–Dawley rats were observed for sexual activity after being administered HU-210 (6.25-25µg/kg, i.p) or a vehicle of dimethyl sulfoxide:Tween-80: physiological (0.9%) saline (1:1:8). Rats were placed in a testing chamber with a female partner and sexual behaviour was scored. Contrary to our hypothesis, measurements indicated lower levels of sexual activity in rats administered higher amounts of HU-210, leading to the conclusion that HU-210 decreases sexual behaviour in a dose-dependent manner. However, these deficits may be due to the inhibitory effect of HU-210 on locomotor activity. Future studies should focus on novel sex testing methods which can separately measure motivation and locomotor effects.

Keywords: *sexual behaviour, endocannabinoid, HU-210, cannabinoid*

The consumption of substances containing psychoactive constituents for recreational purposes has been extensive worldwide; one such substance, *Cannabis sativa,* is commonly used by humans in the form of marijuana (Deiana, 2013). Despite having been used by 1 in 7 adults and 1 in 4 students in Canada, cannabis still has not been established as a topic to be broached in public health policy or medical practice

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(Fischer, Rehm, & Hall, 2009). In a 2012 national survey, 45.2% of US high school seniors reported having used cannabis, 36.4% of which had done so in the past 12 months (Johnston, O'Malley, Bachamn, & Schulenberg, 2013). The rising rates of consumption, particularly amongst the adolescent population with earlier onset of use implicate both acute and chronic effects of cannabis as important areas of research.

Cannabis has typically gained attention for affecting perception, motivation and motor abilities, as well as being touted as an aphrodisiac. However, interest has recently arisen on the effects on sexual activity by its chief active ingredient, Δ^9-tetrahydrocannabinol (Δ^9THC), which is an agonist of the presynaptic cannabinoid 1 receptor (CB_1-R) inhibiting the release of neurotransmitters such as glutamate, dopamine, serotonin and acetylcholine (Gorzalka, Hill, & Chang, 2010). Other compounds used to study this receptor include the nonselective endogeneous cannabinoid receptor ligand and partial CB_1-R agonist anandamide, and the selective CB_1-R agonist, (-)11-hydroxy- Δ8-tetrahydrocannabinol (HU-210).

While the CB_1-R's role in sexual behaviour is not completely understood, they are found throughout the central nervous system (CNS) and are implicated in the endocannabinoid system's role in modulating gonadal hormones such as androgens, estrogens, progesterone, and gonadotropin-releasing hormone, thereby influencing sexual functioning and reproductive neuroendocrinology (Gorzalka & Dang, 2012). Though implicated in neuroendocrinology, researchers have attempted to identify a central, neurological mechanism of the CB_1-R separate from its gonadal effects. This was prompted by the finding that cannabinoid-induced augmentation of sexual activity in female rats prevailed upon the removal of adrenal steroids, implicating central neural processes independent of adrenal hormones (Gordon Bromley, Gorski, & Zimmermann, 1978).

One of these posited mechanisms involves the motor system. CB_1-Rs in the cerebellum and striatum appear to have an inhibitory effect on motor skills. Mice injected with a variety of CB_1-R agonists have been shown poorer coordination and overall performance on motor tasks (Patel & Hillard, 2001). Given that locomotion is necessary for copulatory success, any motor effects experienced from cannabinoid intoxication may impair sexual performance. A second mechanism is via the dopaminergic reward pathway; a network of synapses between the ventral tegmental area, the nucleus accumbens, the striatum, and the ventral pallidum, which is believed to be responsible for motivation-related pleasure (French, Dillon, & Wu, 1997; Gardner & Vorel, 1998). Studies have shown THC increases dopamine in the nucleus accumbens and striatum by acting as a dopamine re-uptake inhibitor (French et al., 1997). This causes increased firing of the pathway which magnifies the intensity of the reward for motivated behaviours such as eating, drinking, and having sex (Nestler & Carlezon, 2006). These two contrasting mechanisms may explain the contradicting findings in the human and animal sexual behaviour literature.

In men, frequent cannabis consumption has been linked to a decline in sexual function, marked by decreased sexual motivation and increased erectile dysfunction rates (Halikas, Weller, & Morse, 1982). Conversely, other studies have found increased satisfaction and intercourse duration in both sexes due to enhanced sensory perception (including tactile sensitivity), slowed temporal perception, and

intensified feelings of sexual arousal, all of which result in a longer-lasting and more satisfactory experience (Tart, 1970). Other research suggests that cannabinoids may inhibit or facilitate sexual behaviour in a dose-dependent manner: participants of a questionnaire that studied the quantity of marijuana consumed and sexual activity reported decreased sexual activity when taking high doses, and greater sexual activity and excitement after taking low doses (Koff, 1974). Such inconsistencies in human studies may be accredited to individual differences in usage habits, developing tolerance to the drug, or the subjective nature of self-reports.

Concurrent research involving rat models has also been inconsistent; both facilitation and inhibition of sexual activity have been observed upon cannabinoid administration. Female sexual behaviour seems to be facilitated by cannabinoids in a dose-dependent manner: Gordon et al. (1978) found increased sexual receptivity in female rats given low doses of 0.5 and 1.5 mg/kg of THC, but a decrease for the higher dose of 3.0 mg/kg. As these effects prevailed upon the removal of adrenal steroids, a direct effect on the CNS was implicated rather than hormonal changes induced by THC (Gordon et al., 1978; Turley & Floody, 1981). One process that may be involved is central dopamine transmission. Graham and Pfaus (2010) concluded that dopaminergic activity is key to proceptive and receptive behaviours such as lordosis in female sexual behaviour. A marked increased in dopamine release has been observed during in males during mating, particularly in the nucleus accumbens and striatum, regions associated with incentive motivation and pleasure (Pfaus et al., 1990). While female and male sexual behaviour both operate upon different hormones, both may be regulated by the dopaminergic reward system or some other central process.

With respect to male sexual behaviour in rodent models, cannabinoids appear to exert an inhibitory effect in a dose-dependent manner (Merari, Barak & Plaves, 1973; Murphy, Gher, Steger & Bartke, 1994). Ferrari, Ottani, and Giuliani (1999) initially observed that higher doses of HU-210 from 12.5–100 µg/kg caused a significant decline in locomotor activity (exploration, grooming and rearing) in rats, leading to the speculation that diminished locomotion plays a key role in inhibition of sexual activity. This theory was supported in a subsequent study when Ferrari, Ottani, and Giuliani (2000) found decreased copulatory behaviour in male rats injected with doses of HU-210 between 25-100 µg/kg. The level of reduction in sexual activity was proportional to the amount of HU-210 administered (Ferrari et al., 2000).

However, the inhibitory results were potentially exaggerated by using doses higher than typical human exposure levels and a selectively binding agonist far more potent than THC (Gorzalka et al., 2010). Nevertheless, this trend seems not to apply to certain substances at lower doses. For example, when injected with low doses of the endogenous CB_1-R ligand anandamide, male rats showed increased mount, intromission and ejaculation frequencies, yet larger intromission and ejaculatory latencies at higher doses (Martinez-Gonzalez et al., 2004).

While more research is yet to be conducted on lower dosages in order to elucidate the mechanism of this effect, the dopaminergic reward pathway is the basis of one potential explanation. The numerous discrepancies within the literature indicate a more complex relationship between the dose of CB_1-R agonists and sexual behaviour than previously thought. Some studies demonstrate that inhibition of sexual behaviour by cannabinoids while others

indicate facilitation. We believe that these observations are due to a dose dependent interaction between cannabinoid's effect on locomotion and sexual motivation.

However, two critical complications are revealed. Firstly, the question arises of which specific doses of HU-210 and other CB_1-R agonists produce either inhibitory or facilitatory effects on sexual behaviour. In male rats, past studies examining the relationship between sexual activity and HU-210 have exclusively used doses greater than or equal to 25µg/kg- all of which were found to decrease sexual activity (Ferrari et al., 2000). With dosages under 25µg/kg largely unaccounted for in the literature, it is therefore necessary to extend examination of the dose-response effect and establish the complete pattern of cannabinoid-mediated sexual behaviour. This is a preliminary step to be conducted before ascertaining whether or not any proposed mechanisms are responsible.

Alternatively, the possibility remains that both mechanisms are influential in varying degrees and conflict with one another. This second caveat is exacerbated by the differing roles of male and female rats during sex: as males typically initiate copulation, locomotor deterioration may simply override the desire to engage in sex, leaving males lethargic and unable to act upon any sexual motivation. Any facilitation of sexual behaviour via activation of the dopaminergic reward pathway may be masked by the locomotor deficits, which increase in severity with higher doses of HU-210 (Ferrari et al., 1999). At lower doses, locomotor effects may be less prominent, allowing increased motivation to exert its facilitating effects on sexual behaviour.

With consideration of the previous results of Gordon and colleagues (1978), Stella (2001), and Martinez-Gonzalez et al. (2004), we hypothesize that low doses of HU-210 will increase levels of motivation and sexual activity while higher doses will yield sedative effects causing locomotor deficits and therefore reduced copulation. The dosage response curve will thus exhibit an inverse-U-shaped pattern of sexual activity. More specifically, we predict that enhanced motivation will lead to a rise in levels of sexual activity at the lowest doses of 6.25 µg/kg and 12.5 µg/kg, and that motor deficits will cause declined sexual activity at 25 µg/kg. Our present study aims to ascertain the dose-response curve for HU-210 and sexual behaviour in male rats by replicating the method used by Ferrari and colleagues (2000) but with lower doses.

Method

Subjects

The subjects were male (n = 28) and female (n = 14) Sprague-Dawley rats (age = 65 days) from the Charles River Breeding Center (Saint Constant, Quebec, Canada). Female rats had been previously ovariectomized and administered 75 mg/kg ketamine hydrochloride and 7 mg/kg xylazine as anesthesia during the procedure.

Prior to testing, rats were housed in same-sex groups of two in 28x17x21 cm clear Plexiglass cages lined with Aspen chip bedding and containing one polycarbonate tube (10cm in diameter x 15cm long). The male and female rats were kept in separate rooms maintained at 21±1ºC on a reverse 12:12-hour light/dark cycle with lights turned on at 09:00h and off at 21:00h. They received *ad libitum* access to Purina Rat Chow and tap water.

Guidelines of the Canadian Council on Animal Care for ethical treatment of animals

(approved by the Animal Care Centre at the University of British Columbia) were observed and followed.

Drugs and Equipment

The vehicle drug used in this experiment was a mixture of dimethyl sulfoxide (DMSO), Tween-80, and physiological (0.9%) saline in a ratio of 1:1:8, respectively. The treatment groups received HU-210 (Tocris Bioscience, CITY), chosen due to its selectivity for the CB_1-R, dissolved in vehicle solution. Treatment doses of 6.25, 12.5 and 25 µg/kg were selected as representative lower doses. All injections were delivered intraperitoneally. In order to ensure a controlled level of sexual receptivity, ovariectomized female rats received 10 µg per animal of estradiol benzoate (Sigma-Aldrich) 48 hours before testing and 500 µg per animal of progesterone (Sigma-Aldrich) three to six hours prior to each testing session.. The experiment was conducted using sex testing chambers which were 30 x 30 x 45 cm clear Plexiglass bins lined with 2.5 cm aspen chip bedding. Experiments took place in an air-conditioned room (4 x 3 x 1.5 m) under dim light conditions kept at ±21°C.

Experimental Procedure

Before the experimental phase, sexually naïve males were screened for sexual proficiency, defined as achieving ejaculation with a receptive female rat, within a 30 minute period. As all males ejaculated during these sex learning trials, no animals were excluded from the study. Male rats were then randomly assigned to either the vehicle-receiving control group, or one of the three HU-210 treatment groups (n = 7 for all conditions). Drug injections were given one hour before testing. Each male rat underwent a single testing session, which took place between 10:00h and 15:00h. Males were placed into the testing chamber and given five minutes to habituate. After habituation, a receptive female was placed into each chamber and testing was started. Each trial lasted 30 minutes, with females being rotated every ten minutes to control for the Coolidge effect, the occurrence of male sexual fatigue with reinstatement of activity upon introduction to a new female partner (Lester & Gorzalka, 1988).

During the trial, trained experimenters blind to the treatment conditions recorded mount latency (ML), mount frequency (MF), intromission latency (IL), intromission frequency (IF), ejaculation latency (EL), ejaculation frequency (EF). A mount was defined as the male being in position behind the female and thrusting without penile insertion, while an intromission was defined by penile-vaginal penetration. The general procedure was consistent with that of Ferrari et al. (2000).

Results

All data are presented as means ± standard error of the mean (SEM) for each group condition (dosage level) over the test period. A one-way (between-subjects) analysis of variance (ANOVA), followed by a Tukey HSD test, was conducted on the mean ML, MF, IL, IF, EL and EF between all group conditions/dosages.

ANOVA revealed that as the dose of HU-210 increased, sexual behavior was more inhibited. As shown in *Figure 1*, ML increased with dosage [$F(3,25) = 13.350$, $p < .001$]. No significant differences were found between the ML of the following: control (0 µg/kg) and 6.25 µg/kg ($p = 1.00$), control and 6.25 µg/kg ($p = .899$) and 6.25 µg/kg and 12.5 µg/kg groups ($p = .899$). However a significant difference was found between 25 µg/kg and

all other groups ($p < .05$). The same pattern held for IL [$F(3,25) = 13.405$, $p < .001$] where the 25 µg/kg group was significantly different from all other groups ($p < .05$) (*Figure 2*). The EL also increased with higher dosages [$F(3,25) = 6.222$, $p = .003$] (*Figure 3*). A significant difference in EL was found between those injected with 0.00 and 25.00 µg/kg ($p < .05$), and 6.25 and 25.00 µg/kg ($p < .05$). With respect to MF, subjects exhibited no significant difference between doses [$F(3,25) = 2.053$, $p = .13$] (*Table 1*). The mean IF decreased with larger dosages [$F(3,25) = 3.878$, $p = .02$] (*Figure 4*). Rats injected with 25.00 µg/kg had a significantly lower IF than control animals ($p < .05$). The mean IF for 12.50 µg/kg was slightly larger than the mean IF for 6.25 µg/kg, however this difference was not significant ($p = .803$). The EF also decreased with higher HU-210 dosages [$F(3,25) = 4.897$, $p = .008$] (*Figure 5*). There was also a non-significant increase in EF between control animals and animals injected with 6.25 µg/kg ($p = .847$), followed by a significant continuous decrease in EF between 6.25 and 25.00 µg/kg ($p < .05$).

Figure 1. Mean mount latency, or time taken before female rats were initially mounted by male rats administered the CB-1_R agonist HU-210 at doses of 0.00 (control group with vehicle), 6.25, 12.50, and 25.00 µg/kg. Rats injected with 25.00ug/kg HU-210 took a significantly longer amount of time to mount female rats compared to control and rats injected with the two lower doses (p < .05). Error bars represent one standard error of the mean.

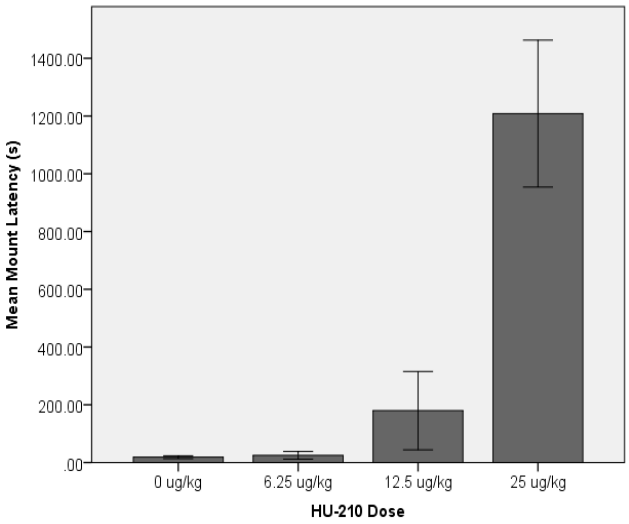


Figure 2. Mean intromission latency, or time taken before the first intromission by male rats administered the CB-1_R agonist HU-210 at doses of 0.00 (control group with vehicle), 6.25, 12.50, and 25.00 µg/kg. Rats injected with 25.00ug/kg HU-210 took a significantly longer amount of time to engage in intromission compared to control and rats injected with the two lower doses (p < .05). Error bars represent one standard error of the mean.

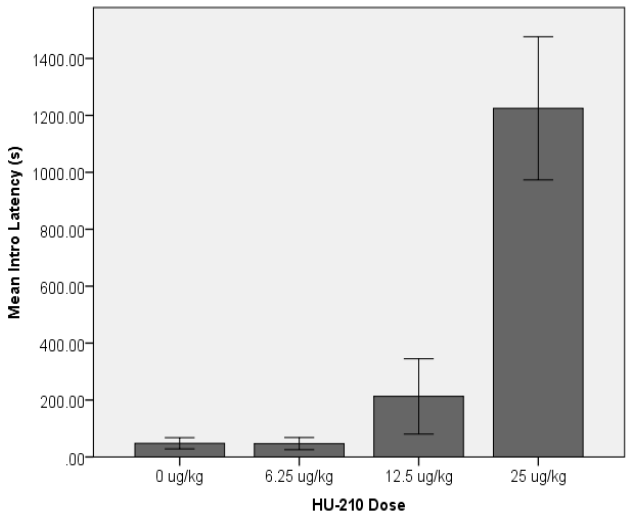


Figure 3. Mean ejaculation latency, or time taken before the first ejaculation by male rats administered the CB-1_R agonist HU-210 at doses of 0.00 (control group with vehicle), 6.25, 12.50, and 25.00 µg/kg. Rats injected with 25.00ug/kg HU-210 took a significantly longer amount of time ejaculate compared to control and rats injected with 6.25 µg/kg ($p < .05$). Error bars represent one standard error of the mean.

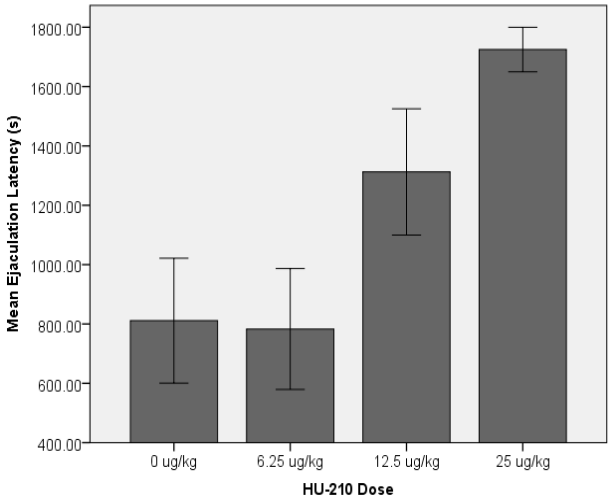


Table 1. Mean mount frequencies of rats injected with 0.00, 6.25, 12.50 and 25.00 µg/kg of HU- 210

Dose of HU 210	0.00 µg/kg	6.25 µg/kg	12.50 µg/kg	25.00 µg/kg
Mount Frequency (± SEM)	5.83 ± 1.85	4.86 ± 1.24	8.88 ± 2.65	2.63 ± 1.28

Figure 4. Mean intromission frequency, or number of intromissions by male rats administered the CB-1_R agonist HU-210 at doses of 0.00 (control group with vehicle), 6.25, 12.50, and 25.00 µg/kg. Rats injected with 25.00ug/kg HU-210 engaged in significantly less intromissions compared to control rats ($p < .05$). Error bars represent one standard error of the mean.

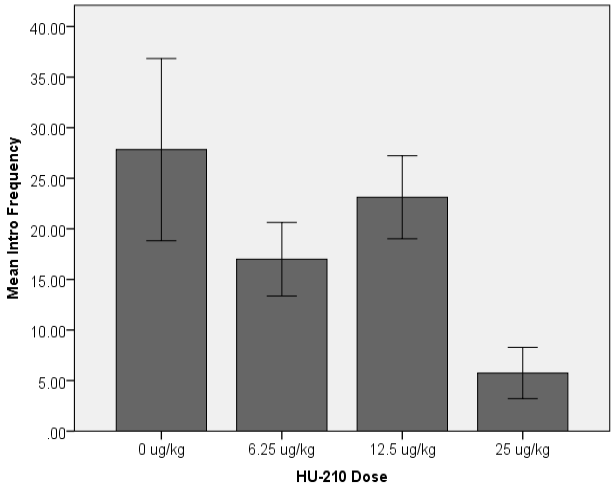
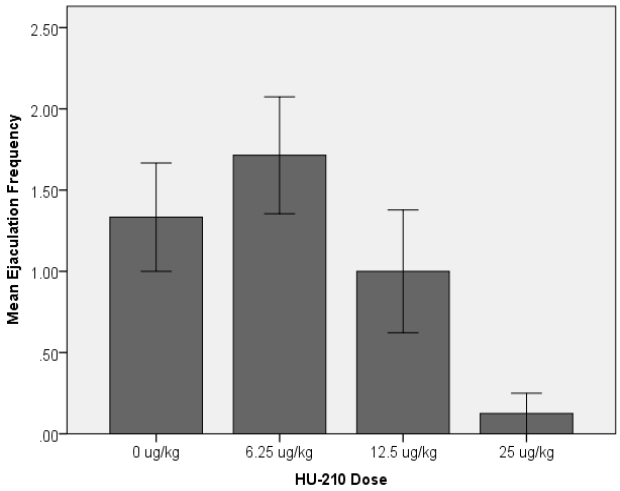


Figure 5. Mean ejaculation frequency, or number of ejaculations by male rats administered the CB-1_R agonist HU-210 at doses of 0.00 (control group with vehicle), 6.25, 12.50, and 25.00 µg/kg. Rats injected with 25.00ug/kg HU-210 engaged in significantly less ejaculations compared to rats injected with 6.25 µg/kg ($p < .05$). Error bars represent one standard error of the mean.



Discussion

We hypothesized that lower doses of HU-210 would facilitate sexual behaviour due to the drug increasing activation of the dopaminergic reward pathway, followed by decreased sexual behaviour at higher doses due to the drug's inhibitory effects on motor performance. However, the data did not exhibit this predicted inverted U-shaped pattern (i.e. increased sexual activity at the lowest tested dosages of HU-210 followed by a decrease upon higher dosages). Instead, as more HU-210 was administered, sexual behaviour steadily decreased on average across all dosage conditions, as observed by increases in ML, IL, EL and decreases in IF and EF. Slight increases in sexual activity (IL and EF) were observed in the mid-range of our dosage conditions (6.25 and 12.5 µg/kg), but the differences were not significant.

Despite the fact that our study did not yield the exact dosage-response curve hypothesized, it confirmed the deleterious effect of HU-210 on male copulatory behaviour and expanded the range of dosages ascertained to inhibit sexual activity. This pattern of activity coincides with previous findings that increasing the dosage of a cannabinoid decreased sexual behaviour (Ferrari, Ottani, & Giuliani, 2000; Merari, Barak, & Plaves, 1973; Murphy, Gher, Steger, & Bartke, 1994). However, contrary to other experiments that have used HU-210, our experiment shows a significant deficit in sexual behaviour at 25.00 µg/kg. Ferrari et al. (2000) used doses as low as 25.00 µg/kg, and only saw such deficits with single doses above 50.00 µg/kg. This might suggest that our cohort of rats had lower basal sexual activity levels, differences which could be attributed to the use of a different strain of rats or a different breeder.

Our findings are inconsistent with Martínez-González et al. (2004) who found that the endocannabinoid anandamide increased some measurements of sexual behaviour at lower doses – a finding that has yet to be replicated. It is possible that the different physical and biochemical properties of anandamide and HU-210 could have caused such discrepancies. HU-210 is a synthetic full agonist that selectively binds to the CB_1-R, making it a superior drug when studying the function of the CB1-R specifically (Gorzalka et al., 2010). Anandamide, on the other hand, is a partial agonist of both the CB_1-R and cannabinoid type 2 receptor (CB_2-R), with much weaker activation than seen with HU-210 (Roberts, Christie, & Connor, 2002). More research should be conducted on anandamide's effect on sexual behaviour (Gorzalka & Hill, 2006).

At first glance our findings suggest greater evidence for locomotor inhibition than the sexual facilitation which Stella (2001) and Martinez-Gonzales et al. (2004) found and attributed to motivational pathways. However, there is not enough data to either confirm or discredit the theories of either mechanism. The apparent lack of evidence for the motivational mechanism may be explained by a key complication: namely that there may be facilitation of sexual behaviour via activation of the dopaminergic reward pathway, but that this activation is entirely masked by locomotor inhibition. Indeed, the interrelatedness and similarity of measurements for sexual motivation and locomotor abilities make for results that are difficult to interpret when evidence in favour of both is present. Increased latencies due to impaired movement may be misinterpreted as a lack of motivation, yet lower sexual motivation results in decreased sexual behaviour and thus less motor activity. This elucidates a

need to separate these factors via implementation of new methods for measuring sexual behaviour.

Our findings are qualified by several limitations. Seven subjects were used per experimental group; this small sample size may have prevented certain differences from becoming significant. This study also examined 4 dosages in fairly large increments, ranging from 0 - 25µg/kg. Using more treatment conditions may have allowed us to detect subtle, yet significant trends in behaviour. Furthermore, since the objective of our experiment was to establish a dosage-response curve rather than determine the mechanism of selective CB_1-R agonists and sexual behaviour, no explicit measures of motivation or locomotion were taken. Further research centered on these measures is needed before conclusions can be drawn regarding precise neural processes.

Future experiments should be conducted to further identify the mechanisms behind the behavioural effects observed. In order to independently assess locomotor ability and sexual motivation, the use of different measures would be beneficial. For example, the changes in locomotor ability could be detected by measuring sexual behavior in an open-field test (OFT), a technique commonly used to test rodent exploration and measure anxiety. In the OFT, rodents are placed into the corner of an arena demarcated into measured squares in order to track exploration as a function of squares traversed over a period of time (Wilson, Vacek, Lanier, & Dewsbury, 1976). If movement throughout the field is similar between cannabinoid and vehicle groups, while sexual behaviour scores differ, the motivational mechanism may be supported. If locomotor patterns were different, this would coincide with the suggestion of the locomotor mechanism. Additionally, if the locomotor inhibition was the primary cause of decreased sexual behaviour, the same diminishing effects may also be seen in females. Their sexual proceptivity and receptivity, largely determined by movements such as lordosis, ear-wiggling and hop darts, may decline, as found in studies by Gordon et al. (1978) and Stella (2001).

If the OFT results supported the idea of locomotor inhibition compromising sexual activity in spite of any potential changes in motivation, follow-up tests could be conducted. However, corroboration of the locomotor mechanism does not preclude a drug-induced augmentation or decline in motivation that affects sexual activity. These effects on motivation may be determined via more specific behavioural testing techniques.

The novel sexual motivation test described by Lopez, Olster, and Ettenberg (1999) is another viable option to measure behavioural changes as a function of motivation. Here, male sexual motivation is measured using the straight-arm runaway test, in which sexually experienced male rats are separated by a straight bridge from female rats in behavioural estrous. The time taken for males to cross the bridge and initiate copulation with the female is measured. This has been theorized to be a better measurement of sexual motivation than more commonly used methodologies. The information gathered from these proposed experiments would be critical in determining how HU-210 decreases sexual behaviour.

This study has expanded the knowledge of the endocannabinoid system, suggesting that even at low doses close to those of human cannabinoid consumption, CB_1-R agonists exert inhibitory effects on male sexual behaviour. This research may have translational value, suggesting that

general CB_1-R activation diminishes sexual behaviour. However, this conclusion is not entirely resolute as the observed decline in sexual activity may be purely due to CB_1-R locomotor inhibition rather than a consequence of altered motivation. While the neurological basis of these effects is still to be determined, the pervasiveness of cannabis use implicates another worthwhile field of research: evaluating the potentially negative ramifications of cannabis use on sexual function. Future directions include examining the inhibitory effects of human sexual performance by acute and chronic marijuana use, in areas such as motivation and physiological function.

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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CLINICAL
Research Report

Categorization Judgments in Hoarding Disorder

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Abstract

Frost & Hartl (1996) proposed that individuals with problematic hoarding might define categories more narrowly and produce a larger number of groups than do healthy individuals (i.e., underinclusiveness). Underinclusion may be due to a tendency to define concepts with more complexity, which makes the categorization of objects more difficult because individuals would have to consider all aspects of an object before categorizing it. This difficultly, and its associated stress, can lead to an accumulation of objects in the home (Frost & Hartl, 1996). Using unstructured sorting tasks, some studies have found underinclusiveness as a categorization deficit, while others have not (Kellman-McFarlane, 2013). These studies focused on the number of categories created, but neglected important aspects of the categorization process. The present study re-examined photographic data collected from a previous study comparing participants with hoarding disorder and healthy controls on item sorting tasks (Kellman-McFarlane, 2013). Using these photographs, we observed the frequency of object pairings across groups and analyzed the degree to which participants with hoarding disorder made categorization decisions that were congruent compared to those made by healthy controls. Our study did not find any significant differences between the variability of categorization decisions made by individuals with hoarding disorder and healthy controls, which suggests that both groups make similar categorization judgments.

Keywords: *hoarding disorder, decision-making, categorization, underinclusiveness*

The prevalence of hoarding disorder (HD) is estimated to be 2-5% in the population (lerovolino et al., 2009; Mueller, Mitchell, Crosby, Glaesmer & Zwaan, 2009; Samuels et al., 2008). Although HD had previously been defined as a subtype of obsessive compulsive disorder, it recently gained its own distinct diagnosis in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders. The criteria for HD includes: having a persistent difficulty in parting with possessions regardless of actual value, due to a perceived need to save the items; and experiencing distress associated with

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discarding them. This difficulty in discarding results in the accumulation of possessions that congest and clutter active living areas, which causes clinically significant distress or impairment in social, occupational, or other important areas of functioning (American Psychiatric Association, 2013).

There are several psychological and physical impairments associated with HD. Individuals with HD experience significant distress associated with excessively accumulating items in the home and have difficulty discarding these items. Hoarded items prevent individuals with HD from using the space in their homes for their intended purpose, and can cause hazards such as falling objects from tall piles of items. HD can also affect the well-being of family members, especially for those sharing the home. The social and economic burden of HD can include domestic disputes within the family as well as financing special task forces delegated by the government to help clean out homes of individuals with HD (Frost, Steketee, & Fitch, 2008; Tolin, Frost, Steketee, Gray, & Finch, 2008). Surrounding communities can also be affected as the volume of items in a hoarded home can pose as a fire hazard. The volume of items can be fodder for intense fires and can also block entrances, making it more difficult and dangerous for fire crews to put out fires (Frost, Steketee & Williams, 2000). The sanitation of hoarded homes, especially ones involved with animal hoarding (the collection of a large number of animals), affects the welfare of the individual, the animals, and neighbors (Patronek, 1999). Understanding the underlying mechanisms associated with HD can inform treatment and help individuals deal with their hoarding behaviours.

In 1996, Frost and Hartl proposed a cognitive behavioural model for HD. They defined clinical compulsive hoarding as significant distress caused by the excessive acquisition and difficulty discarding a large number of possessions that are of limited value, resulting in cluttered living spaces (Frost & Hartl, 1996). As part of their model, Frost and Hartl listed some cognitive deficits that may be present in individuals with HD, such as difficulties associated with decision-making, categorization/organization and memory. One of these categorization deficits is known as underinclusiveness, which is the tendency to define categories more narrowly and to create a larger number of categories with fewer members in them (Frost & Hartl, 1996).

Compared to individuals without HD, individuals with problematic hoarding tend to create a larger number of categories with fewer members within them on sorting tasks. Individuals with HD may demonstrate this underinclusive categorization style because they have more complex concepts of categorizing possessions, which require more detailed information to inform their decisions. This may be because individuals with HD view objects as unique and complex and consider all aspects of an object before categorizing or choosing to discard it, resulting in a difficulty in sorting and discarding objects and the accumulation of items (Frost & Hartl, 1996). However, individuals with HD have not demonstrated underinclusivity in every study. Mixed results could be due to the fact that each study investigating underinclusion used slightly different types of methods (some used words as stimuli and other used objects). Another reason for mixed results could be due to the characteristics of the sample used for analysis, such as age, gender and comorbidity of other disorders. In addition, early studies did not include a subclinical group, meaning they did not have consistent criteria for group assignment within their sample. Therefore, it

is still unclear whether or not underinclusion is a real deficit found in individuals with HD (Frost & Hartl, 1996; Grisham, Norberg, William, Certoma & Kadib, 2010; Hayward, 2011; Luchian, McNally & Hooley, 2007; Persons & Foa, 1984; Wincze, Steketee & Frost, 2007).

In 2013, Kellman-McFarlane attempted to clarify these mixed results in the literature with improved methodology and a more representative sample. Compared to previous studies, Kellman-McFarlane (2013) had a standardized list of objects to sort, used actual items for sorting, and established a subclinical group. Although her results did not support the hypothesis that individuals with HD exhibit underinclusion, a different way to test for categorization deficits may be necessary. Instead of focusing on the number of categories made, more research on what types of categories individuals with HD make and the reasons behind their categorization decisions should be investigated.

For this purpose, the current study used data collected from Kellman-McFarlane (2013) to examine categorization decisions made by individuals with HD, subclinical, and healthy controls. Rather than focusing on the number of piles made, we were interested in whether individuals with HD made similar categories compared with healthy controls and what items the categories were composed of. To get an idea of how individuals with HD categorize objects, we examined the frequency of object pairings for different types of objects, and analyzed whether participants in the hoarding group made categorization decisions that were congruent with those made by healthy controls. We expected individuals within the HD group to have less agreement of object pairings, thus, make less congruent categorization judgments when compared with individuals within the healthy control group, as this disagreement in individuals with HD may be related to deficits associated with categorization processes.

Method

Participants

The participants in the present study were recruited and categorized by Kellman-McFarlane (2013). A phone screen, the Hoarding Rating Scale (HRS; Tolin, Frost, & Steketee, 2010) and Clutter Image Rating Scale (CIR; Frost, Steketee, Tolin, & Renaud, 2008) were used to establish three participant groups: HD, subclinical, and healthy control. 33 individuals met the criteria for clinical hoarding symptoms, 38 for subclinical hoarding and 30 individuals served as healthy controls. Putting up posters in community centers in Vancouver and posting online ads on websites such as Craigslist and Kijiji were used to recruit participants. The inclusion criteria required participants to be fluent in English, between the ages of 18-65 (65 was chosen to eliminate individuals whose hoarding symptoms were due to age-related cognitive decline) and not currently undergoing any medical or psychological treatment.

Table 1. Gender and age as a percentage of the sample of each group.

		Group			
	Entire Sample (N = 101) n (%)	Control (n = 30) n (%)	Subclinical (n = 38) n (%)	Clinical (n = 33) n (%)	*p*
Female	62 (61)	22 (73)	19 (50)	21 (64)	.13
Age (*M*, *SD*)	36.28 (12.20)	31.74 (12.93)	34.96 (14.12)	43.47 (13.28)	

Note: one participant did not provide demographic information for gender.

Procedure

The present study examined photographic data collected by Kellman-McFarlane (2013). During their laboratory session, participants were given three unstructured sorting tasks to complete in an unlimited amount of time: "typically hoarded items," "trivial items" and "personal items." The present study focused on the "typically hoarded items" task, which included 20 items that are typically found in hoarded homes and were of little monetary value. These items were chosen to capture five themes of items that are found in hoarded homes: clothing, office supplies, reading material, used containers, and bathroom items. The participants were instructed to separate these items into different piles in a way that made sense to them, and told that a pile could have as few or as many objects as they wanted. Photographs of the piles made by the participants were then taken (Kellman-McFarlane, 2013).

Two coders from our lab at the Centre for Collaborative Research on Hoarding at the University of British Columbia, examined these photographs from Kellman-McFarlane's study, independently counted the number of times each item was paired with the other 19 items in each picture, and then discussed their results. Any discrepant frequencies were discussed until an agreement was reached. Missing items (unable to see in the photo) and whether the item was by itself (a pile that consisted of one object) were also counted.

Data Analysis

The agreed upon frequency for each item pair in each group were converted into a consensus rating. The consensus rating was calculated using the following equation: $|X - (N/2)|/(N/2)$ where X is the number of participants who agreed on that item pair and N is the total number of participants in the group. This formula provided us with the proportion of participants who agreed on each item pair. The consensus ratings ranged from zero to one, where zero meant maximum disagreement and one meant maximum agreement. There are two ways that maximum agreement can occur: if everyone agreed that item A should be paired with item B (for example if N = 30, X = 30; |30-

(30/2)|/(30/2) = 1) or if nobody agreed that item A went should be paired with item B (if N = 30, X = 0; |0-(30/2)|/(30/2) = 1). Maximum disagreement occurred if half of the participants in the group agreed that item A should be paired with item B (if N = 30, X = 15; |15-(30/2)|/(30/2) = 0). We expected individuals with HD to have consensus ratings closer to zero, meaning they disagreed more with each other. We expected healthy controls to have consensus ratings closer to one, meaning they agreed more with each other. We then analyzed each group for variance using a one-way ANOVA.

Results

The independent variable in our study was participant group (HD, subclinical and healthy controls) and the consensus ratings were the dependent variable. The means and standard deviations of the consensus ratings for each group are as follows: HD: *M* = 0.86, *SD* = 0.19; subclinical: *M* = 0.89, *SD* = 0.20 and healthy control: *M* = 0.83, *SD* = 0.22. The means of the consensus ratings show that participants in all groups had high agreement on which items should be paired together. As demonstrated in *Figure 1*, the entire sample's consensus ratings were clustered around one (maximum agreement).

We used a one-way ANOVA to test for group differences for the degree of agreement of item pairings from the "typically hoarded items" task. Levene's test was used to determine if there was heterogeneity of variance and an arcsine square root transformation was used to correct for the positive skew of agreement ratings. No significant difference was found between groups, F (2, 531) = 2.14, *p* = 0.12. F*igure 2* illustrates this non-significant difference in the frequency of consensus ratings by group. The consensus ratings of individuals with HD were found to be not significantly different from healthy controls; individuals with HD had similar agreements of object pairings to healthy controls.

Figure 1. The Frequency of Consensus Ratings. This figure illustrates that there was a lot of agreement about item pairings (most of the ratings are cluttered around one).

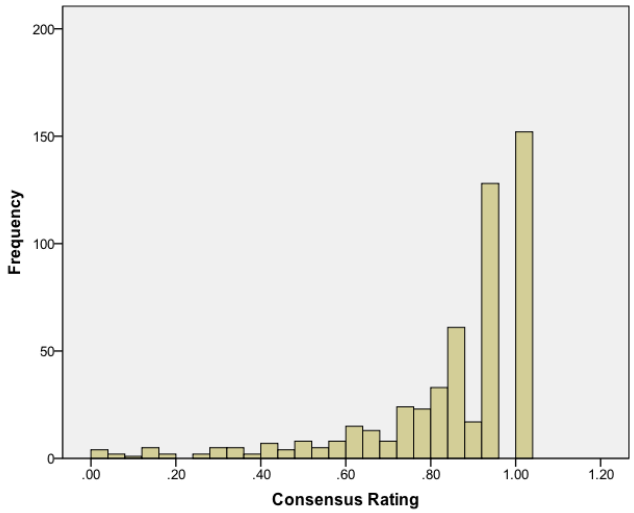
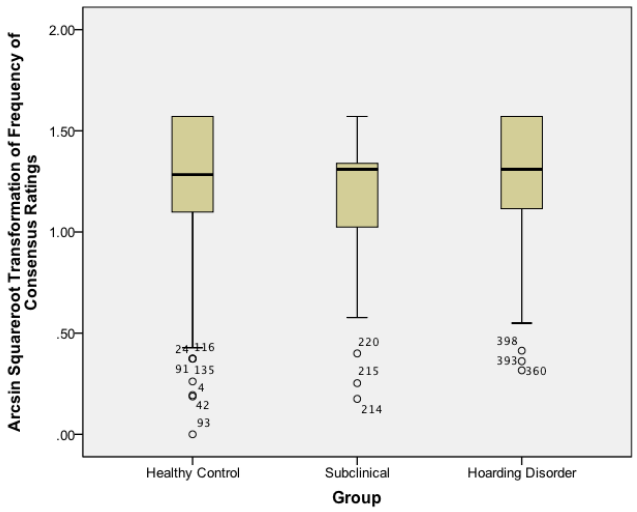


Figure 2. Arcsin Square Root Transformation of Frequency by Group. This figure illustrates that all the groups had similar consensus ratings.



Discussion

Our study attempted to investigate aspects of the categorization process in hoarding disorder, which is a topic that has not been heavily researched. Using the data from Kellman-McFarlane (2013), we were able to begin to look at aspects of the categorization process and how people differentiate between objects by examining the congruency of categorization decisions in hoarding disorder, rather than just counting the number of piles created after completing a sorting task, which has been the standard in past research exploring underinclusivity and categorization/organizational patterns of individuals with HD. Our data did not support our hypothesis, that individuals in the HD group would have less agreement about what items should be paired together compared to individuals in the healthy control group. We did not find evidence that individuals with HD make categorization decisions that are significantly different from those without the disorder, $F\ (2,\ 531) = 2.14$, $p = 0.12$. One reason why we did not detect a significant difference may be due to the design of the task. As mentioned, the "typically hoarded items" task included items that had implicit categories within them (clothing, office supplies, reading material, used containers and bathroom items). In a sense, this was an "easy" task, because there were implicit underlying categories for the items that participants could easily see. These underlying categories limit our study because they could have been guiding decisions related to categorization regardless of whether or not participants were in the HD or healthy control group. The implication could be that the frequencies should be similar because a categorization scheme already exists that participants in both groups can follow similarly.

To minimize this confound, future studies might benefit from analyzing photos of piles made of items without underlying categories. Kellman-McFarlane (2013) included two other tasks in addition to the "typically hoarded items" task. One of these additional tasks was called "trivial items," which were items with little underlying categories within them and of little monetary value. Because this task included items with few underlying categories, it was meant to be a "harder" task compared to the "typically hoarded items" task. Kellman-McFarlane predicted that items in the "trivial items" task would get categorized into a greater number of piles relative to the "typically hoarded items" task. Kellman-McFarlane's last task consisted of personal items that participants were to bring with them to the study from a standardized list. This task was used to test whether emotional attachment affected categorization decisions. Due to time constraints, the present study did not include these tasks in our analysis but examining the piles made in these two additional tasks would have given us greater insight on the impact of underlying natural categories and emotion on the way individuals with HD make categorization decisions, and whether they are different than those without HD.

A second limitation of our study is directly related to the impact of the setting in Kellman-McFarlane (2013). The unstructured sorting tasks were completed in a lab setting, which was free from the chaotic environment of hoarded homes. The implication of this could be that the surrounding environment can affect categorization decisions. Is it more difficult to make decisions in a chaotic environment? Are these decisions any different from those made in a laboratory setting? This is an area of research that should be looked into further.

A third limitation is that with the available data, the current design only had the ability to look at the frequency of pairs of items created by the participants. Kellman-McFarlane (2013) did not ask participants about the reasons behind their categorization decisions and our data were only composed of photos of the piles created. We could not infer the reasons behind why certain items were grouped together just based on looking at the item pairs. We could only observe the frequency of items that were paired together. Future studies that can find a method which allows an examination of the relationship of all of the items in each group with one another, instead of just pairs of items, will provide more information about the way individuals with HD categorize items in the way that they do. An alternative would be to conduct a new study, where participants are asked directly after they complete the sorting tasks to state the reasons behind their categorization decisions. The reasons given may provide insight on the categorization processes in individuals with HD.

A fourth limitation of our study was that we only used two independent coders. There was some discrepancy between the coders on the frequencies of some object pairings. Reasons for discrepancies were usually associated with whether or not the coder could see the items in the photos, due to either poor placement of the items or poor quality of the photos. Discrepancies due to one coder's inability to see the item usually resulted in the other coder locating the item in the picture and a discussion of how that item should be considered. The coders explained their reasons to each other and came up with an agreed score, but having a third coder could reduce some of the subjectivity associated with coding.

HD is a serious psychological illness that affects the lives of not only the individual, but of their surrounding family, community and resources. While there are active studies underway attempting to understand the underlying mechanisms of HD, there is still a lot of research to be done. To be able to create effective treatments for HD, we must first understand the underlying cognitive aspects of the disorder, such as the categorization and organizational styles of individuals with HD. Future research should address the categorization processes by looking at the reasoning behind why individuals with HD categorize in the way they do. Research on categorization can inform treatments that can help individuals with HD manage their possessions and begin to use the space in their homes more effectively.

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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Cognitive
Research Report

When You Look Me In The Eyes:
The eye contact effect, memory, and gender

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Abstract
Previous research suggests that eye contact can help you remember an individual's face, but can it also help you remember what they say? The present study investigated whether eye contact could facilitate memory for information presented verbally. Participants were asked to remember a list of words that were read aloud by a female experimenter who either made eye contact with a participant or not. Next, the participants were presented with a combination of novel and studied words on a computer screen and were asked to identify whether a given word had been presented previously or not. Results showed that females benefited from eye contact on recognition tests; however, this benefit was not observed in males. These findings suggest that eye contact has differential effects on memory for verbal information in males and females. This is consistent with the notion that females are more attentive to nonverbal behavior than males.

Keywords: *eye contact, memory, gender*

From infancy on, humans preferentially attend to the eyes of other individuals (Farroni, Brockbank, & Simion, 2000), and this tendency persists through one's lifetime (Driver, Davis, Ricciardelli, Kidd, Maxwell, & Baron-Cohen, 1999). It is suggested that this early eye gaze preference may play a fundamental role in the development of social and cognitive abilities (Mason, Hood & Macrae, 2004). In regards to its importance in social functioning, a number of studies have demonstrated that eye gaze conveys a wealth of social information (Argyle & Cook, 1976; Kleinke, 1986). For example, direct gaze may be considered a display of affection (Kellerman, Lewis, & Laird, 1989), power (Dovidio & Ellyson 1982; Thayer, 1969), or competence (Wheeler, Baron, Michell, & Ginsburg, 1979). On the other hand, a failure to preferentially attend to the eye region and maintain mutual gaze is associated with severe impairments in social and communicative abilities (Baranek, 1999; Baron-Cohen, 1995). In comparison to the functional importance of eye gaze in social domains, the present study explores the potential influence that eye gaze may have on cognitive functions, specifically, the effect of eye contact on attention and memory.

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Eye contact, attention, and cognitive processing. Recent research suggests that perceived eye contact captures and holds one's attention (Senju & Johnson, 2009). For example, Senju and Hasegawa (2005) had participants perform a target detection task where a face was presented with direct gaze, averted gaze, or eye closed prior to the presentation of the target. Individuals took longer to detect targets when the face was gazing directly at them compared to when the face was looking away or had its eyes closed. This delay in target detection may result from an innate human tendency to pay more attention to direct gaze as it simulates perceived eye contact (Senju & Johnson, 2009), and thus, it may take longer for people to disengage from direct gaze and shift their attentional resources elsewhere. This suggests that perceived eye contact may influence the allocation of attention.

In addition to its influence on attention, perceived eye contact have also been found to facilitate other cognitive processes. For instance, individuals were significantly faster at categorizing faces based on their gender when the target face was displaying direct gaze compared when it was displaying averted gaze or had its eyes closed. (Macrae, Hood, Milne, Rowe, & Mason, 2002). In addition, the amount of eye contact given by the experimenter while reading out the instruction has shown to enhance participants' performance on digit-coding task (Fry & Smith, 1975).

More relevant to the current study are research showing that eye contact can help to improve visual memory. For example, research has shown that faces displaying direct gaze are more memorable than faces with averted gaze (Mason et al., 2004). Individuals were instructed to view pictures of faces displaying either direct gaze or averted gaze and to perform non-memory-related tasks, such as age-categorization and target detection. Following a filler task, individuals were presented with a surprise recognition task, in which they showed better memory for faces previously presented with direct gaze than those with averted gaze. These data indicate that perceived eye contact enhances visual memory even when encoding of the face was not intentional.

One proposed explanation of the cognitive benefits associated with eye contact is outlined by the affective arousal model. This model suggests that eye contact enhances attention and other cognitive functions by evoking arousing and emotional responses (Senju & Johnson, 2009). Indeed, mutual gaze has been shown to provoke emotional and physiological arousal (Nichols & Champness, 1971). For example, participants report greater levels of tension (Argyle & Dean, 1965) and show higher levels of physiological arousal (Kleinke & Pohlen, 1971; Nichols & Champness, 1971) when making eye contact relative to when they are not. Indeed, many studies have demonstrated that arousal enhances the selectivity of attention (Easterbrook, 1959), attentional disengagement (Fox, Russo, Bowles, & Dutton, 2001), as well as efficiency of processing of arousing stimuli (Hansen & Hansen, 1988; Ochsner, 2000). Presumably, increased arousal resulted from making eye contact in turn, influences attention paid to the arousing stimuli, in this case, the individual making eye contact.

Eye contact and gender. In relation to the effect of eye contact on visual memory, research suggests that gender may modulate this relationship. In a study by Vuilleumier and colleagues (2005), participants viewed photographs of faces varying in direction of eye gaze (direct vs. averted) and head position (straight vs. rotated by 30º) and

classified the faces based on the gender. Subsequently, they performed a memory task which involved making "yes" or "no" decisions about whether the face shown had been presented in the preceding study phase. In the categorization task, participants took longer to identify the gender of faces of the opposite gender. Furthermore, all participants recognized faces that displayed direct gaze better than those with averted gaze when the face was rotated 30º in the subsequent memory task. When faces of the *opposite gender* were presented straight on, direct gaze impaired face recognition. However, when the face was the same gender as the participant, direct gaze improved recognition performance.

Moreover, other studies suggest that the gender of the perceiver can also influence the effects of eye contact. In a study by Bailenson et al. (2001), participants walked around a virtual space where a virtual representation of a person (i.e., avatar) was standing. The avatar displayed varying degrees of gaze behavior (from no eye contact to staring), and the distance between self and the agent was measured. The results showed that people maintained a larger distance when the virtual agent was displaying direct gaze, but this effect was much greater in females than males. This finding speaks to higher levels of sensitivity to eye gaze found among females compared to males.

The finding that perceived eye contact have differential effects on males and females in these studies is not surprising given that males and females respond to nonverbal social cues differently. That is, females are more sensitive to nonverbal behaviour and are better able to identify such behaviour in others compared to males (Hall, 1978; McClure, 2000; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979). In addition, females tend to pay more attention to social stimuli, such as faces and eyes, very early on in life (Connellan, Baron-Cohen, Wheelwright, Batki, & Ahluwalia, 2000; Lutchmaya, Baron-Cohen, & Raggatt, 2002a). Thus, females may benefit more from eye contact than males as a result of their overall sensitivity to nonverbal cues.

Eye contact, verbal memory, and gender.

Based on current research, eye contact may facilitate memory by increasing arousal and the subsequent allocation of attention (Senju & Johnson, 2009). Given that perceived eye contact can facilitate memory for visual information in general (Mason et al., 2004; Vuilleumier et al., 2005), it is plausible that the effects of eye contact extend to other domains of memory (e.g., verbal information). Indeed, there is some evidence showing that the levels of direct gaze displayed by the speaker enhances information processing and later recall in audience (Otteson & Otteson, 1980; Sherwood, 1987). Based on this idea, the present study aimed to more closely examine how making eye contact with a verbal-information provider would influence later memory and recall of a verbal-information receiver at a more fundamental level.

The present study investigates the effect of eye contact on verbal memory by having participants remember a list of words read aloud by a female experimenter who is either gazing towards them or not. We hypothesize that direct gaze provided by the experimenter will lead to a better performance in a word-recognition task. If the effect of eye contact is not limited to processing and encoding of visual information (e.g., faces), items verbally presented with eye contact would more likely to be recalled compared to those presented without eye contact. In addition, given that

gender modifies the effect of direct gaze on visual memory, it is an important factor to consider when examining the effects of the perceived eye contact on verbal memory. We hypothesize that the memory enhancing effect of eye contact would be greater in females considering their responsiveness to the effects of eye gaze (Bailenson et al., 2001; Bayliss, Pellegrino, & Tipper, 2007). On the other hand, males are expected to show less improvement in verbal memory with eye contact compared to females considering the effect of relative genders of the gazer (e.g., female experimenter) and the perceiver (e.g., male participants).

Method

Participants

A total of 88 undergrad students from University of British Columbia participated in this study; 48 were females and all had normal or corrected-to-normal vision. Participants received course credit or money ($5) for their participation. All were naive to the purpose of the study and were fully debriefed at the end of the session. The study received ethics approval from the UBC Behavioral Research Ethics Board.

Stimuli

The stimulus pool comprised of 120 words from MacDonald and MackLeod (1998). All words were nouns from 5 to 10 letters long, with frequencies greater than 30 per million (Thorndike & Lorge, 1944).

Apparatus

E-Prime 2.0 (www.pstnet.com) was used to control the timing and presentation of stimuli read aloud by the experimenter to the participant. It was also used to present the test stimuli and log response accuracy and response times during the recognition task.

Design

Encoding condition (Eye-contact vs. No-eye-contact) was a within-subjects independent variable whereas gender (Male vs. Female) was a between-subjects independent variable. Response times and accuracy in the recognition test were measured as dependent variables.

Procedure

In the study phase of the experiment, participants were seated across from a female experimenter and asked to study a list of words that were read aloud by the experimenter. The list consisted of 80 randomized words drawn from the pool of 120 words, read individually by the experimenter. For 40 words, the female experimenter made eye contact with the participant while reading out the word (eye-contact condition), and for the other 40, the experimenter did not (no-eye-contact condition; see *Figure 1*). The words and eye contact instructions were randomly intermixed to create six randomized word list. All items were rotated through all of the conditions and the six lists were counterbalanced across participants. Participants were also instructed to make eye contact with the experimenter and to look at the experimenter's eyes even when the experimenter was not looking back at them (i.e., when the experimenter was looking down at the screen).

Figure 1. Examples of the encoding conditions. For the words in the eye-contact condition, a female experimenter made eye contact with the participant while reading out the word (left). For the words in the no-eye-contact condition, the experimenter looked down at the screen while reading out the word (right).

During the study phase, the experimenter sat in front of a laptop displaying the target word to be read aloud (e.g., "captain") and the gaze instruction (i.e., whether or not to make eye contact with the participant) on any given trial. The laptop was only visible to the experimenter. In each trial, a fixation cross appeared for 500 ms in the centre of the screen to mark the beginning of the trial. A black screen then appeared for 1000 ms. Next, the gaze instruction was presented, which directed the experimenter to "look toward participant" (eye-contact condition) or "look toward screen" (no-eye-contact condition). After 1000 ms, a word to be read also appeared and remained on screen for 3000 ms with the gaze instruction. Upon seeing the word, the experimenter instantly read the word aloud while either making eye contact or not. Next, a 500 ms blank interval followed[1]. The experimenter was looking down at the screen throughout the experiment unless reading out the words in the eye-contact condition.

Immediately after the study, participant performed a recognition task on the laptop. In this task, participants were presented with a word on a screen and were required to press a button on the keyboard to identify whether the given word was on the study list or not. The test stimuli consisted of 120 words: The 40 words studied with eye contact, 40 words studied with no eye contact, and 40 new words. The test words were presented in random order, and all words were presented in white font on a black background. Participants were instructed to respond with a key-press to the presentation of the word. They were required to press a button labelled "Old" if the word was on the study list and to press a button labelled "New" if it was not. There was a 500-ms blank interval before each word appeared on screen, and the word offset with the subject's key-response. After the recognition test, participants filled out a demographic questionnaire.

Results

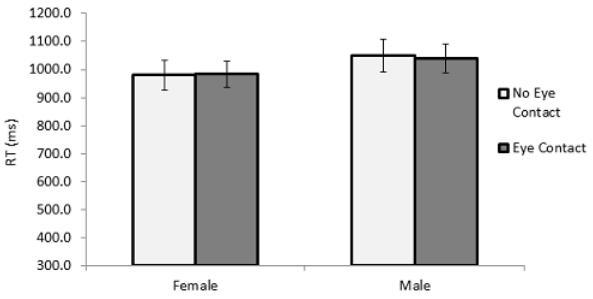
A two-way mixed ANOVA was conducted on response times (RT), response accuracy, and sensitivity with encoding condition (2 levels:

[1] For some of the participants, the experimenter heard the word through a set of headphones rather than seeing the word on a computer screen. We analyzed the data using headphones (2 levels: Headphones present vs. headphones absent) as an additional variable. There was no main effect of headphones, nor an interaction between headphones and any of the other values (all F's > 1).

eye-contact and no-eye-contact) as the within participant factor and gender (2 levels: male and female) as the between participant factor.

Response Times. After conducting an analysis on response accuracy, trials on which errors occurred were removed (24.57 %). The remaining analysis was conducted on the correct responses only. Mean RT is presented in *Figure 2*. There were no main effects of gender [$F(1, 86) = 0.755$, $p = 0.387$] or encoding condition [$F(1, 86) = 0.018$, $MSE = 360.838$, $p = 0.892$], nor was there an interaction between gender and encoding condition [$F(1, 86) = 0.018$, $MSE = 1798.934$, $p = 0.763$].

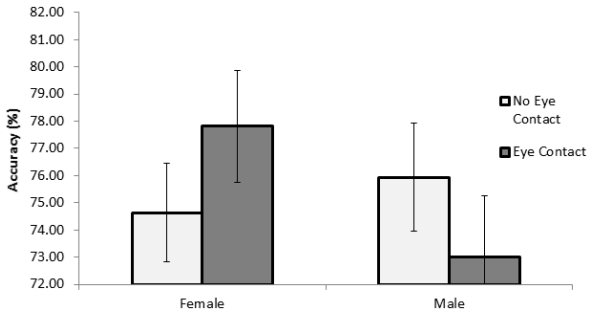
Figure 2. Mean RTs of female and male participants in no-eye-contact and eye-contact conditions as a function of gender. Error bars represent standard errors.



Accuracy. Mean response accuracy is presented in *Figure 3*. Overall, participants produced correct "old" responses for 75.43% of previously exposed words and correct "new" responses for 86.08% of novel words. The analysis was done only on the correct "old" responses as comparing memory for words presented with eye contact and those presented without eye contact was the main purpose of this particular study.

There was no main effect of encoding condition [$F(1, 86) = 0.017$, $MSE = 0.626$, $p = 0.897$] or sex [$F(1, 86) = 0.416$, $MSE = 134.433$, $p = 0.521$]. However, there was an interaction between eye contact and gender [$F(1, 86) = 10.927$, $MSE = 407.871$, $p = 0.001$].

Figure 3. Mean accuracy (%) for no-eye-contact and eye-contact conditions as a function of gender. Error bars represent standard errors.

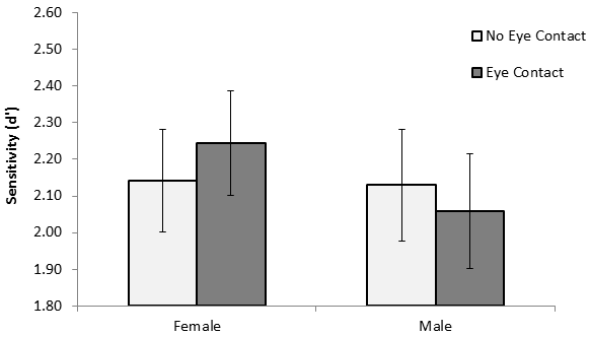


Two-tailed repeated measures t-tests were conducted to further assess the interaction between sex and eye contact. In females, recognition was more accurate for items presented with eye contact [77.81% (*SD* 12.55)] than for items presented with no eye contact [74.64% (*SD* 14.52); $t(47) = 2.580$, $p = 0.013$]. In males, however, recognition was less accurate for items presented with eye contact [73.00% (*SD* 12.57)] than for items presented with no eye contact [75.94% (SD 13.89); $t(39) = 2.119$, $p = 0.041$].

Sensitivity (*d'*). Mean sensitivity (*d'*) data are presented in *Figure 4*. The pattern of results replicated the accuracy data, indicating no main effects of gender [$F(1, 86) = 0.235$, $MSE = 0.431$, $p = 0.629$] or eye contact [$F(1, 86) = 0.136$, $MSE = 0.011$, $p = 0.713$], but an interaction between them [$F(1, 86) = 4.095$, $MSE = 0.335$, $p = 0.046$] was found. Two-tailed repeated measures t-test was conducted on these *d'* values, and it also showed similar patterns to the accuracy data. In females, there was a significant difference between the d' scores, with better memory for the words in the eye-contact condition [*d'*

= 2.245 (*SD* 0.891)] than for the words in the no-eye-contact condition [*d'* = 2.141 (*SD* 0.919); *t*(47) = 2.371, *p* = 0.022]. For males, *d'* value was smaller for the eye-contact condition [*d'* = 2.058 (*SD* 1.099)] than no-eye-contact condition [*d'* = 2.129 (*SD* 1.021)], but the difference was not significant [*t*(39) = 0.906, *p* = 0.371].

Figure 4. Mean *d'* values for no-eye-contact and eye-contact conditions as a function of gender. Error bars represent standard errors.



Discussion

The goal of this study was to examine whether making eye contact with another person can enhance memory for items verbally presented by the person. We hypothesized that the perceiver would pay more attention to the words presented with eye contact and thus, show better encoding and later memory. Moreover, we also hypothesized that this memory enhancing effect of eye contact would be greater in females, since they are more responsive to eye gaze and other nonverbal cues than males. The results showed that although eye contact improved memory in females, eye contact impaired memory in males.

Eye Contact Benefit in Females.

As suggested, improved memory in females can be explained by the notion that eye contact is more likely to capture and retain attention in females. In comparison to males, females dedicate more attention to social stimuli, such as faces and eyes (Connellan et al., 2000; Lutchmaya et al., 2002a) and more easily decode the nonverbal signals exhibited by others (Hall, 1978; McClure, 2000; Rosenthal et al., 1979). More importantly, previous studies have demonstrated that females are more responsive to eye gaze (Bailenson et al., 2001; Bayliss et al., 2007). Given that females are more sensitive to nonverbal behavior in general and eye gaze cues in particular, it is not surprising that females showed better memory performance when eye contact was provided. Since females are more likely to detect and respond to eye contact, eye contact was better able to engage attention of females and enhance their verbal memory.

It should be kept in mind that in the present study, participants made eye contact with the female experimenter while listening to the list of to-be-remembered words. Considering this, the same-gender biases can account for the memory enhancing effect of eye contact found among females. Previous research has shown that shared membership (e.g., ethnic background) between people enhances processing of faces (Cassidy, Quinn, & Humphreys, 2011). Similar to shared membership, shared gender also enhance processing of faces as females show better processing and recognition of female faces than males (Lewin & Herlitz, 2002). Thus, the same-gender biases may have enabled females to better process the eye gaze of the female experimenter. This within-gender processing benefit may have further enhanced the processing of direct gaze, which in turn, would have strengthened the

effect of eye contact on verbal memory in females, but not in males.

Eye Contact Disadvantage in Males. Unlike females, males showed impaired memory for the words that were read with eye contact, suggesting that making eye contact with a female experimenter is disadvantageous for males. It is plausible that male participants experienced excessive levels of arousal while making eye contact with the female experimenter, as making eye contact with the opposite sex produces higher levels of arousal compared to making eye contact with the same sex (Argyle & Dean, 1965). Although the affective arousal model posits that increased arousal caused by eye contact lead to better memory (Senju & Johnson, 2009), an inverted U-shaped relationship may exist between levels of arousal and performance, as proposed by the Yerkes-Dodson Law (Yerkes & Dodson, 1908). Such a relationship would suggest that cognitive performance decreases when the levels of arousal become too high (Freeman, 1940; Stennett, 1957). Accordingly, eye contact provided by the female experimenter may have presented an intense arousal in males, and as a result, males may have had difficulty paying attention to the words, thus interfering with their performance on the memory task.

One possible confounding factor is that dominance and social status may have contributed to impaired memory in male participants. That is, direct gaze can be perceived as a display of power and dominance (Dovidio & Ellyson, 1982; Thayer, 1969), and the relative genders of the gazer and perceiver can impact how influential such display can be (Berger, Rosenholtz, & Zelditch, 1980; Meeker & Weitzel-O'Neill, 1985). For example, displays of dominance by women are less effective than if men engaged in such behaviour, especially with a male audience (Driskell, Olmstead, & Salas, 1993; Keating, 1985) since traditional sex roles are less tolerant of such displays by women (Carli, LaFleur, & Loeber, 1995). As such, the female experimenter's direct gaze may have been perceived as a violation of gender norms by males, and thus, it may have failed to produce beneficial influence on verbal memory in males.

Implication and Future Directions.
Considering that the major limitation of this study is that we only employed the female experimenter, it is necessary to conduct this experiment using a male experimenter as a gazer to better understand the relationships among eye contact, verbal memory, and gender. It is speculated that females would show better memory when eye contact is made with a male experimenter since they are responsive to eye gaze irrespective of the gender of the gazer (Bailenson et al., 2001; Bayliss et al., 2007), However, it is also plausible that if the levels of arousal produced from opposite-sex eye contact become too high, females would experience interference in their verbal memory when the gazer is male. On the other hand, males are expected to show better memory when making eye contact with a male experimenter, since in this case, the same-sex bias would work in their favor while the high levels anxiety caused by making eye contact with the opposite-sex would not be present.

There are a number of ways to further extend findings from this study. We speculated that eye contact would capture attention of the perceiver by acting as an arousal stimulus and therefore, enhance encoding and later recall. However, it would be necessary to employ objective measures of arousal (e.g., palm perspiration, heart rate, etc.) during encoding and compare levels of arousal in the eye-contact and no-eye-

contact conditions to confirm that increased arousal caused by eye contact underlies theses processing benefits. Further, it would be interesting to examine the effect of eye contact beyond a one-on-one interaction. In the present study, eye contact was made in a one-on-one setting between the female experimenter and a participant. However, it is possible that making eye contact with someone while other people are present might have a different effect on one's cognition. In fact, previous research has shown that children who received teacher's gaze during a group storytelling session showed better memory for the story than those who did not receive teacher's gaze regardless of their gender (Otteson & Otteson, 1980). Presumably, in a group setting, eye contact enhances memory in the perceiver, irrespective of gender. Further research employing a gazer providing verbal information to multiple perceivers would be necessary to understand the effect of eye contact on verbal memory in a group interaction.

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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Cognitive
Research Report

Let's Play the Blame Game… Sir:
The Effects of Social Hierarchy on the Attribution of Blame for Memory Failures

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Abstract
People make different interpretations about memory failures depending upon the type of memory failure committed. The interpretations of two different types of memory failures were examined in this experiment: Prospective memory failures (failing to recall a future intention or plan, e.g., to reply to an email once you get home) and retrospective memory failures (failing to recall details from the past, e.g., someone's name). As well, the current study examined the possibility that these interpretations are influenced by the social status of the protagonist of each failure. Participants read vignettes describing memory failures committed by people varying in social status within a workplace, and then rated potential causes for each failure. Overall, higher status individuals' memory failures were rated as more serious and more likely being due to personality factors if they were retrospective rather than prospective. Interestingly, when participants and protagonists shared social status, blame for memory failures was attributed to external causes significantly more than internal causes. These results lend support to previous findings that memory failure type has an effect on the interpretation of memory failures, as well as providing preliminary evidence that social status also has an effect on the attribution of blame for memory failures.

Keywords: *memory failures, social status, attribution of blame, interpretation of memory failures*

A memory failure, which is the inability to recall information, is an example of an everyday event that often gives rise to interpretation of causation. There are different types of memory failures that individuals may experience on a daily basis, and these failures can be interpreted differently depending upon the type of memory failure that has been committed. Two types of memory failures that give rise to such interpretations are: Prospective memory failures (ProM) (failing to recall a future intention or plan, e.g., to reply to an email once you get home) and retrospective

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memory failures (RetM) (failing to recall details from the past, e.g., someone's name). Freud (1952) and Bennett (1910) have suggested that the inability to carry out plans, which is characteristic of a prospective memory failure, is indicative of a character flaw. This interpretation of a prospective memory failure to be the result of a character flaw indicates an internal, rather than external, attribution for the failure. An example of this is if you had asked someone to pick up groceries on the way to your home, but they forgot. Munsat (1967) shares this view on memory failure interpretation, and has proposed that repeated failures in retrospective memory are seen as cognitive failures, whereas failures in prospective memory are seen as a fault in personality. In a recent study, Graf (2012) presented vignettes involving protagonists committing different types of memory failures and found that ProM failures are interpreted as flaws in character, whereas RetM failures are interpreted as failures in cognition. This study conducted by Graf (2012) provides empirical evidence to support the hypotheses made by Munsat and Freud.

Memory failures involving other individuals entail a social aspect for their interpretation. Interpersonal processes, such as attributions for another's actions, provide information regarding social relationships, which allows individuals to make sense of their social world (Lee & Tiedens, 2001). These attributions can also be used in everyday life to establish and reinforce social hierarchies (Lee & Tiedens, 2001).

The interpretations of everyday events, such as memory failures, may be contingent upon the context and characters presented within it. As suggested by Graf (2012), the type of memory failure can influence interpretation. It is possible that the characteristics of the protagonist themselves may affect interpretations as well. Shaver (1985) has hypothesized that when perceivers are developing interpretations of events involving blame, they rely partly upon the expectancies derived from the social role that the individual occupies. For example, high status individuals, by virtue of their roles, have the ability to control outcomes; they have the power or ability to get things done, and if they do not, they contradict their role expectations (Lee & Tiedens, 2001). This tendency to attribute blame based upon an individual's social role may be extrapolated to memory failures. For example, if an office manager, a high status individual, had promised to send out an important email at the end of the day, the employee would expect the manager to be able to complete that task. If a high status individual were to commit a memory failure, such as forgetting to send out an email, this result would contradict the expectations we have for them, and may possibly lead to the attribution of the failure to be seen as a lack of motivation or a character flaw on the part of said high status individual.

A study by Aquino, Tripp, and Bies (2001), which investigated the relationship between blame, revenge and hierarchical status within a workplace, has found that the relationship between the attribution of blame for a personal offense and subsequent revenge behavior was moderated by both victim-offender relative status and the victim's absolute hierarchical status. In other words, they found that the victim of a personal offense who blamed the offender sought revenge more often when the offender's status was lower than the victim's. As well, they found that when the victim's absolute hierarchical status, their status relative to everyone else within the workplace, was low, they would seek out

revenge against the offender more often instead of reconciliation. This finding suggests that hierarchical status within a workplace may influence subsequent decision-making regarding the resolution of a situation in which blame has been attributed. It would therefore be pertinent to understand the actual relationship between relative hierarchical status and the attribution of blame itself.

As previously discussed, violations of role expectations of high status individuals, for example committing a memory failure, can color our interpretations of the events (Lee & Tidens, 2001; Shaver, 1985). As such, it is hypothesized that participants will attribute memory failures of higher status individuals as a flaw in personality or motivation. Additionally, we hypothesize that memory failures of lower status individuals will instead be attributed to a cognitive error or memory slip. As well, it is also hypothesized that participants, who assume the role of a middle status individual in our constructed workplace hierarchy, will blame their peer group (in-group) members less harshly than those of either higher or lower status within the workplace. Through their review of the literature on prejudice, Pettigrew (1979) predicts that negative or undesirable behavior committed by out-group members will be attributed to personal, dispositional causes in comparison to the same action done by an in-group member. Due to the in-group bias, the interpreter associates themselves with their in-group members, and attempts to maintain their self-esteem by attributing negative actions committed by in-group members to external causes (Tajfel, 1974). Considering lower status individuals are out-group members, while at the same time might have low expectations given their social roles, it is unclear in the literature whether lower status individuals would be treated any more harshly than higher status individuals.

The goal of the present study is to investigate the extent to which the protagonist's, the individual who is committing the memory failure, level of social status influences the interpretations of the causes of memories failures. By presenting participants with vignettes of memory failures committed in our constructed workplace hierarchies by individuals of higher, similar, or lower status than themselves, and asking for their interpretations of these failures, we can attempt to answer this research question.

Method

Participants and Design

Ninety-five undergraduate students (72 female, 23 male) from the University of British Columbia Psychology Department were recruited through the human subject pool, from which they received partial course credit for their participation in the study. Prior to their participation in the experiment, individuals were given a review of the study procedures, as well as given an opportunity to ask questions before providing written consent. We utilized a 2 x 3 within-subjects design to investigate the effects of the type of memory failure (prospective or retrospective) and level of status (high, medium, or low status) on memory failure interpretations. Participants completed all tasks in a single session on a computer, which took about 30 minutes to complete.

Materials

The short version NEO Five Factor Inventory (Costa & McCrae, 1992) was administered to measure individual differences in personality

factors, and to see if personality traits correlated with tendencies in memory failure interpretations. The questionnaire consisted of sixty statements, to which participants rated their agreement on a five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) to statements such as "I am a worrier" (this example assesses neuroticism). The five personality factors assessed are the "big-five:" Agreeableness, conscientiousness, extraversion, neuroticism, and openness to change.

Twelve vignettes were created for the purposes of this study. Each vignette was three to four sentences in length. The twelve vignettes were split into two conditions, A and B, each containing six vignettes. Within each condition, the vignettes were split into sets of three, therefore creating Set 1A, Set 2A, Set 1B and Set 2B. Each vignette set included an equal combination of retrospective and prospective memory failures, as well as an equal combination of protagonists belonging to each level of social status. Each participant would receive six vignettes, either condition A or condition B of the study. Sets 1 and 2 were counterbalanced across subjects, such that half of the subjects received Set 1 first, and the other half received Set 2 first. These vignettes varied on two dimensions: social status of the protagonist committing a memory failure (high, middle, and low level) and the memory failure type (prospective and retrospective). Each vignette began by describing the context of the memory failure from the point-of-view of the participant. The beginning of the vignette stated the workplace setting (either a retail setting in an electronics store, or a newspaper office) and the position within the workplace that the participant should imagine themselves in (for example, as a salesperson). Each workplace included a three-tiered hierarchy. Within the electronics store vignettes, positions included a manager in the high status position, a salesperson in the middle status position, and a new trainee in the low status position. The newspaper office vignettes followed a similarly structured hierarchy, in which there was an editor (high status), writer (medium status), and intern (low status). The description of the context was followed by the description of the memory failure itself, which involved a protagonist committing either a prospective or retrospective memory failure within the workplace, who was of higher, equal, or lower status than the participant. Finally, the consequences of the memory failure were described. The consequences within each workplace were maintained to be as equal as possible across vignettes. For example, the protagonist missing a deadline for submitting a column in the newspaper office "receives a warning" as a consequence for their memory failure. In the retail setting, forgetting to take down inventory which was put on display results in the employee also receiving a warning. Location of the memory failure and workplace, as well as the presentation order of the vignettes, was counterbalanced across participants.

Alongside each vignette was a six-point agreement scale, for each of the 12 statements regarding the interpretation of each memory failure. These statements were designed such that two different statements would measure one underlying construct, and so, in total, six constructs were being assessed. These six constructs included attributing the memory failure to the protagonist's "brain," "disposition," "lack of motivation" or "personality factors," as well as rating their attribution of the memory failure to "external factors," and rating the "seriousness" of the memory failure itself.

Single sentence memory check questions were multiple-choice, each with

three possible single-word answers. Manipulation check questions involved testing for the perceived social status of the protagonists in the vignettes. The manipulation check involved the rating of the level of social status of an individual from the vignettes on a six-point scale (1 = very low to 6 = very high).

Procedure

Once the participant had given consent to participate, they would first be given a NEO personality inventory on a computer, in which they would be rating their agreement to sixty statements on a five-point scale. Once the short form NEO had been completed, the computer program notified participants to inform the experimenter, so that they could be given further instructions on the next phase of the experiment. Participants were then told that they would be presented a series of vignettes occurring within a workplace, within which they should imagine themselves in a middle status position. They were also informed that they would be asked a series of multiple choice memory check questions about the vignettes over the course of the session, and that it is important to pay close attention as they read each vignette.

Participants were presented each vignette one at a time. The vignette was presented at the top of the screen alone, and participants were instructed to press the right arrow key once they were ready to continue. There was no time restriction or recommendation on how long the participant had to read the vignette. Upon pressing the right arrow key, the interpretation questionnaire was presented one statement at a time in the middle of the screen, alongside the vignette (for example, a statement such as “A situation like this is very serious”). Below each statement was a six-point agreement scale. Participants were asked to respond honestly when they rated their agreement to each statement. Once a response was made by pressing a number corresponding to their level of agreement, the next statement was presented, until all statements were rated. Once a participant completed the set of questionnaire statements for a vignette, the next vignette from the set was presented, followed again by the interpretation questionnaire, until three of the six total vignettes were presented.

After the third vignette and interpretation questionnaire set was presented, a multiple choice memory check question corresponding to those vignettes appeared to test the participant’s attention to each of the vignettes. Participants selected their answer to the question by pressing the letter corresponding to the multiple choice answer: either a, b, or c. Upon selection of their answer, participants were presented the next memory check question, until the three questions were answered. Each vignette in the set had a corresponding memory check question. Next, the participant would then be presented the second set of three vignettes and interpretation statements, with the memory check questions again following. Once all six of the vignettes, interpretation statements, and memory check questions were completed, the participant was finally presented with a series of manipulation check questions, which asked them to rate the social status of each of the protagonists from the vignettes on a six-point scale. Once the participants completed rating the social status of the protagonists, the program would halt, instructing the participant to inform the experimenter that they had completed the task. The experiment

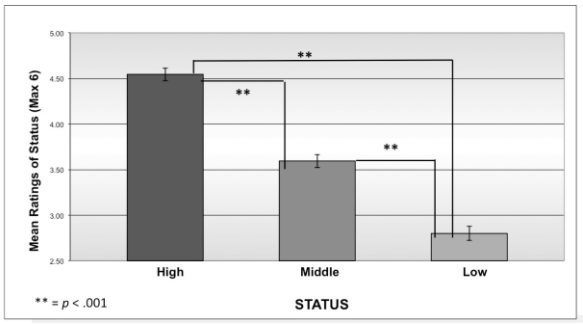
concluded with a verbal debriefing of the participant.

Results

All overall ANOVA's were run with a standard alpha-level cut-off of .05, with follow-up analyses restricted to an alpha level of .015. This reduction in the alpha level was to maintain a reasonable family-wise error rate.

Manipulation Check. A three-way (high, middle and low status) repeated measures ANOVA found a highly significant main effect of status, $F(2,160) = 289.19$, $p < .001$. Follow-up pairwise comparisons indicated that high status individuals were rated as significantly higher in status than both middle status, $t(80) = 13.15$, $p < .001$, and low status individuals, $t(80) = 21,20$, $p < .001$. Middle status individuals were also rated significantly higher in status than low status individuals, $t(80) = 12.83$, $p < .001$. Our manipulation was successful in creating a clear, three-tiered hierarchy across both workplaces (see *Figure 1*). It should be noted that 81 of the 95 participants completed the manipulation check.

Figure 1. Mean ratings of status as a function of position in hierarchy. Error bars signify the standard error of the mean.



Ratings on Interpretation Statements. Bivariate correlational analysis was completed between the interpretation statements that were to be collapsed into six factors (see *Table 1*). Due to a lack of significant correlation between the items attributing the memory failure to the construct "external" causes, the items "distracted" and "due to something outside of their control," $r(93) = .18$, $p = .089$, were analyzed separately.

A 3 x 2 (status x memory failure type) repeated measures ANOVA was run on each of the following assessed factors: Seriousness of the memory failure, personality flaw interpretation, and ratings of perceived control.

Table 1. Correlations between individual interpretation statements within each construct.

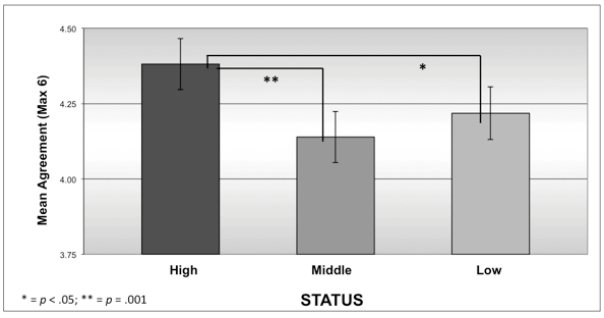
	Brain	Disposition	Seriousness	Lack of Motivation	Personality Factors	External Factors
Two Item Correlations	.20	.81**	.72**	.85**	.84**	.18

**indicates $p < .001$

Two-tailed repeated measures t-tests were conducted to further assess the interaction between sex and eye contact. In females, recognition was more accurate for items presented with eye contact [77.81% (*SD* 12.55)] than for items presented with no eye contact [74.64% (*SD* 14.52); $t(47) = 2.580$, $p = 0.013$]. In males, however, recognition was less accurate for items presented with eye contact [73.00% (*SD* 12.57)] than for items presented with no eye contact [75.94% (SD 13.89); $t(39) = 2.119$, $p = 0.041$].

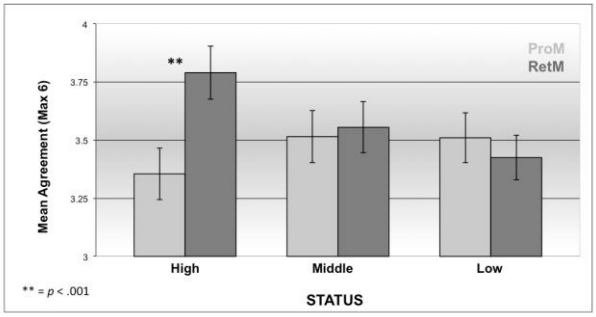
Seriousness Interpretation. A significant main effect of status on seriousness rating was found, $F(2,188) = 5.74$, $p = .004$. Follow-up t-test pairwise comparisons indicated that high status individuals' memory failures were rated as significantly higher in seriousness than middle status individuals, $t(94) = 3.49$, $p = .001$, and was approaching significantly higher ratings in seriousness than low status individuals, $t(94) = 2.22$, $p = .029$ (see *Figure 2*). There was no significant difference in seriousness rating between middle and low status individuals, $t(94) = -1.05$, $p = .298$ (see *Figure 2*).

Figure 2. Mean agreement to statements regarding seriousness as a function of status. Error bars signify the standard error of the mean.



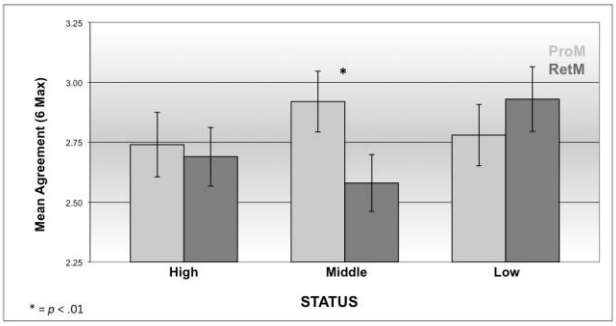
Personality Flaw Interpretation.
A significant interaction between status and memory failure type was found for ratings on personality flaw interpretations, $F(2,188) = 6.39$, $p = .002$. Follow-up t-test pairwise comparisons in which status was held constant found that high status individuals' prospective memory failures were rated as significantly less due to personality than their retrospective memory failures, $t(94) = -3.96$, $p < .001$ (see *Figure 3*). There was no significant difference in the attribution to personality between prospective and retrospective memory failures in either the middle status, $t(94) = -.31$, $p = .759$, or the low status individuals, $t(94) = .87$, $p = .384$ (see *Figure 3*).

Figure 3. Mean agreement to statements attributing cause of memory failure to personality of protagonist as a function of status. Error bars signify the standard error of the mean.



Ratings of Perceived Control. A significant interaction between status and memory failure type was found on ratings to the statement "a situation like this occurs because of something out of this person's control," $F(2,188) = 3.54$, $p = .031$. Follow-up t-test pairwise comparisons in which status was held constant found that middle status individuals' prospective memory failures were rated as significantly more due to something out of the protagonist's control than were their retrospective memory failures, $t(94) = 2.99$, $p = .004$ (see *Figure 4*). There was no significant difference found in ratings of control between prospective and retrospective memory failures in either the high status, $t(94) = .27$, $p = .787$, or low status group, $t(94) = -1.15$, $p = .255$ (see *Figure 4*).

Figure 4. Mean agreement to statements attributing cause of memory failure to something out of the protagonist's control as a function of status. Error bars signify the standard error of the mean.



Individual Differences in Personality Factors. The personality factor "conscientiousness" from the NEO inventory was correlated significantly with agreement to the memory failure interpretation statements "out of control" and "lack of motivation" from the interpretation questionnaire. Conscientiousness was negatively correlated with attribution of the memory failure to something outside of the protagonist's control, $r(93) = -33$, $p = .001$. Conscientiousness was positively correlated with attribution of the memory failure to lack of motivation for retrospective memory failures, $r(93) = .22$, $p = .036$, and for middle status individuals, $r(93) = .21$, $p = .043$.

Workplace Differences. Workplace location was not included as a variable in the overall ANOVA because each subject did not see each workplace location for each type of vignette (e.g., for participant 1, the ProM High status workplace was retail, but for participant 3, the ProM High workplace was at a newspaper). However, *t*-test pairwise comparisons indicated that there was a significant difference in ratings of seriousness of the memory failure between workplaces. The retail workplace memory failures were rated as significantly higher in seriousness than the newspaper office workplace memory failures for prospective memory failures of high, $t(94) = 3.68$, $p < .001$, medium, $t(94) = -3.72$, $p < .001$, and low status, $t(94) = 5.49$, $p < .001$, and retrospective memory failures of high, $t(94) = -4.40$, $p < .001$, and medium status, $t(94) = 4.47$, $p < .001$.

Discussion

The present study yielded three main findings. The first was that, regardless of memory failure type, higher status individuals had their memory failures rated as more serious, as was hypothesized. This finding is in line with previous research which suggested that the contradiction between higher status individuals having perceived control, but then failing to exert that control in a situation, would lead to negative impression and affect towards them (Lee & Tiedens 2001). Our results support the hypothesis that this apparent contradiction between ability and outcome goes against the expectation of the observer, resulting in the memory failure being perceived as more serious. This effect is not seen in the interpretation of memory failures committed by equal or lower status individuals in our study, likely due to the lack of expectancy violation between their perceived role and behavior (Shaver, 1985).

Our second hypothesis was that participants would tend to attribute a memory failure committed by an out-group protagonist to their disposition and personality, whereas they would attribute a memory failure committed by an in-group protagonist to external causes. This hypothesis was supported by the result that participants rated in-group members' prospective memory failures as due to something outside their control more than

retrospective memory failures. From previous research, it has been suggested that prospective memory failures tend to be interpreted as due to internal causes such as personality than an external cause (Graf, 2012). Additionally, it has been found that there is an in-group favoritism effect, in that individuals who belong to an in-group tend to make favorable assessments for other members of their in-group relative to out-group members (Jetten, Spears & Manstead,1996; Otten & Wentura, 2001), and that this favoritism is more strongly expressed in positive valence comparisons than negative valence comparisons (Otten & Wentura, 2001). This hypothesis suggests that instead of blaming the personality of out-group members when they committed a memory failure, which would be a comparison with a negative valence, participants instead compensated by rating the same memory failure committed by an in-group member to be caused by something outside of their in-group member's control, which is a positive comparison. This suggests that the positive comparison regarding an individual's in-group is the driving force behind in-group favoritism. An alternative explanation may be that the negative comparison and positive comparison interact to cause the in-group favoritism effect. Therefore, participant's positive association made to other members of their in-group is preserved through contributing their memory failures to external factors. Our results support that the in-group bias contributed to the interpretations of memory failures, as participants rated in-group members' prospective memory failures as due to something outside their control, relative to out-group members' memory failures. Possibly due to the in-group bias, the result found in Graf (2012), that prospective memory failures tend to be interpreted as due to internal causes, was not found in the interpretation of other middle status individuals' memory failures. This may have been due to the fact that the memory failures in the present study occurred exclusively in workplace settings and were social in nature, whereas vignettes in Graf (2012) occurred in a variety of settings, and were either social or asocial.

Our third hypothesis stated that, in line with previous research, prospective memory failures would be attributed to flaws in character. The results of this experiment suggest a pattern opposite to what we had hypothesized. Due to a significant interaction between status and memory failure type, retrospective memory failures committed by high status individuals were interpreted as due to personality more than the high status individual's prospective memory failures. This result was unexpected, and contradicts previous research and hypotheses (Graf, 2012; Munsat, 1967; Freud, 1952; Bennett, 1910). We would like to see if this result would be replicated in other status hierarchies and in other contexts. For example, in hierarchical structures such as familial hierarchies, or contexts such as in healthcare settings. This would provide insight into the effects of social hierarchies on the attribution of blame for memory failures towards internal versus external causes, which could affect decision making in these various settings. For example, the relative status of a parent to a child may affect the parent's interpretation of blame for a child's memory failure, such as forgetting to take out the trash. An understanding of how relative status affects blame attribution may alter the decision making process of the parent regarding punishment for the memory failure. Participants' personal workplace experiences or the particular depiction of office workplace environments in the media

may have contributed to these unexpected results.

Overall, this study's major limitations are in the sample used and the discrepancy in perceived memory failure consequences between the workplaces. The use of undergraduate students may not replicate the attitudes and dynamics of a true workplace environment and hierarchy. It is unlikely that undergraduate students have experienced working in both a newspaper office setting and a retail setting. There may be workplace dynamics and responsibilities in each setting which are only apparent to those who have experienced working in that environment for an extended period of time. Therefore, the interpretations of memory failures made by undergraduate students imagining themselves within the workplace may not reflect those that would be made by individuals who actually work there. A second limitation of this study is that five of the six memory failures that took place in the retail workplace were rated as more serious than their equivalent vignette in the newspaper office workplace. This is likely due to the fact that memory failures in the retail setting led to loss of actual property due to theft, whereas memory failures in the newspaper setting simply led to failure to publish article(s). This could be resolved in future research by designing consequences that are interpreted as equally serious between workplaces.

Future directions for this research should investigate the interpretations of memory failures and the resulting behaviors in actual workplaces, as well as determining whether our unexpected finding can be replicated. This would give greater external validity to these conclusions in how they relate to blame attribution in the workplace, with the possibility of influencing behavior such as decision-making regarding employment.

In sum, this study lends support to previous findings that memory failure type influences the interpretation of memory failures. This study also provides initial evidence that social status has an effect on the attribution of blame for memory failures. More research is required to confirm our findings and to determine their applicability to everyday workplace settings.

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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The Role of Expertise in the Perception of Musical Cooperation

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Abstract

Expert musicians are successful at collaborating with one another through strong social perception and interaction. Previous research has shown that listeners are sensitive to the degree of collaboration between musicians when asked about synergy, creativity, emotion and engagement in music. The current research investigates how musical expertise influences the perception of musical collaboration in jazz duets. In this experiment, music experts listened to jazz duets varying in the assigned conditions of musical collaboration, from fully live performances (two-way feedback), to studio dubbed performances (one-way feedback), to studio mix (no feedback). Additionally, music experts were categorized according to their social aptitude (Autism Quotient) and musical training (Musical Expertise Questionnaire). Our results indicated that musical experts were sensitive to collaboration in music, but only in the synergy dimension and not for ratings of creativity, emotion and engagement. Additional findings from the analysis of the AQ scores revealed that high self-reported attention to detail was positively correlated with sensitivity towards musical collaboration. While previous research has shown that non-experts rely on their social skills to perceive collaboration in music, the current findings suggest that experts use their analytical and technical skills to perceive collaboration.

Keywords: *music perception, musical expertise, social aptitude, attention to music, collaboration*

Music is often the result of collaboration between two or more individuals. The successful production of music in ensemble performance requires musicians to coordinate and adapt to one another. These skills likely involve a strong sense of human social perception and interaction, which have been linked to the origins of musical collaboration (Cross, 2001; Drake & El Heni, 2003; Kirschner & Tomasello, 2009). In recent years, increased attention has been given to the scientific understanding of music cognition and perception (Bhatara, Tirovolas, Duan, Levy, & Levitin, 2011; Vines, Krumhansl, Wanderley, Dalca, & Levitin, 2005). However, these studies are mainly

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focused on solo musical performances although music is often collaborative and arguably more cognitively complex. Evidence of the complex interactions involved in musical production is demonstrated through joint musical performances where musicians performing together rarely play a score exactly as written. Instead, they collaboratively incorporate variations in timing, amplitude and tone to achieve the common goal of obtaining a unified sound (Keller, 2007; Repp, 1990). Thus, despite the strong social roots of music, little scientific attention has been given to the collaborative and interpersonal aspects of music. This study sets out to investigate these relatively ignored aspects of music cognition and whether collaboration in music influences the perceptual experiences of expert musicians.

In addition to individuals' capacity to interact through strong social perception, literature has shown that humans have a remarkable ability to determine the quality of social interactions as observers. Sensitivity to social cues in observed interactions among individuals can be found across a variety of contexts. A striking example of this is provided by research showing that an observer can accurately predict the future success of a marriage after watching snippets of couples' conversations (Cappella, 1997). Humans' capability of extracting information from observed interactions is also supported by research showing that after studying static pictures depicting pairs of people working together, participants were able to identify the person occupying the leadership position (Mast & Hall, 2004).

These examples reflect how humans have an exceptional capacity to gauge the quality of social interaction even as observers. Ongoing research at the UBC Vision Lab has expanded these findings by demonstrating that this ability is also possible in music, specifically in improvised jazz. Participants listened to jazz duet recordings that varied in their collaboration in music, from live performances to studio dubbed performances, to studio mixed. Results revealed that listeners are considerably sensitive to musical collaboration (Pesquita, Corlins, & Enns, 2014). Jazz standards are a good platform to capture collaboration in music because they allow for high variation from one performance to another. Furthermore, different improvisations of the same standard will be consistent in metrical structure, chordal phrasing, and rhythmic structure (Johnson-Laird, 2002). Therefore, jazz standards are a good medium for collaboration in music and its intrinsic characteristics can be adapted to the purpose of our research.

Whereas this previous study included participants spanning from no musical training to high musical expertise, here we specifically focus on music experts. Our interest in studying an expert population comes from previous studies showing that music expertise modulates several aspects of the listening experience. When compared to listeners with no musical training, musicians are better able to differentiate between similar performances (Bhatara et al., 2011), classify pitch (Bhatara et al., 2011), synchronize to the tempo (Drake, Penel, & Bigand, 2012), and display specific psychophysiological responses to emotional content in music (Drake et al., 2012; Gomez & Danuser, 2007). Of particular relevance to our research is a recent study by Bhatara *et al.* (2011), which examined how musicians and non-musicians react to expressive cues in solo musical performances. They created variations in tempo and pitch in order to communicate emotion to listeners (Bhatara et al., 2011). Listeners were then asked to rate the emotional expressivity of

performances. Results showed that sensitivity to expressive cues increased as a function of musical experience (Bhatara et al., 2011). This evidence suggests that musical expertise may modulate one's experience in music.

To probe whether different degrees of musical collaboration influences listening experience, we compare experts' subjective ratings of the different music categories in the dimensions of synergy, creativity, emotion and engagement. These categories were selected based on previous research which demonstrated their relevance to the appreciation of solo music, as we review briefly below. The dimension of synergy was drawn directly from the Gestalt theory concept that there is added value which occurs when musicians play together to produce music that cannot be achieved through individual performances or the combination of individual performances. That is, the whole is greater than the sum of the parts. Theoretical treatments of creativity in musical ensembles propose that it is based on three defining characteristics: improvisation (in the moment adaptation to the actions of the co-performer during the performative moment), collaboration (the creativity of all members and not with any one person contribute to their interactional dynamics) and emergence (the collective phenomena of the Gestalt theory in which musical patterns surpass either individual performance) (Sawyer, 2006). In regards to ratings of emotionality, research on the perception of solo music has shown that emotions are influenced by expression variations in tempo and amplitude, corresponding in intuitive ways to both positive (e.g., Louder, faster tempo) and negative (e.g., Softer, slower tempo) emotions (Bhatara et al., 2011) emotions. The fourth dimension, engagement, represents the degree to which a particular piece of music captures the listener's interest. The experience of being engaged in a piece of music is often described as finding the groove, which is used by both ensemble musicians and the audience to describe the pleasant feelings of wanting to move some part of the body in relationship to some sound pattern (Madison et al., 2011; Madison, 2006).

We hypothesize that expert listeners will be able to distinguish between live, dub, and mixed recordings when asked about synergy, creativity, emotion and engagement. If so, the subjective ratings in our study will mimic the musical collaboration continuum of the three music categories - live duets (two-way interaction) having the highest ratings, followed by dub (one-way influence) and mixed duet (absence of interaction). This result would further extend the conclusions of the study by Pesquita et al. (2014), which showed considerable sensitivity to musical collaboration in a general population. On the other hand, if there is no significant difference between ratings in live, dub, and mixed duets, we may conclude that musical collaboration in our experiment, did not affect the listening experiences of musical experts. This result would defy previous research (Pesquita, Corlins, & Enns, 2014), and would further inform about the distinct listening profiles of music experts (Bhatara et al., 2011; Drake et al., 2012).

A secondary question addressed by our study is whether social skill moderates experts' sensitivity to musical collaboration in musical performances. Previous research has shown that social skill is positively correlated with participants' ability to correctly identify emotions expressed through music (Bhatara et al., 2010). Given the role of music as a medium for social interaction (Cross, 2001;

Kirschner & Tomasello, 2009), we hypothesize that high social skill will result in higher sensitivity to musical collaboration in musical performances. Thus, we predict that, when compared to the subjective ratings reported by experts with low social skill, the difference between the subjective ratings for live, dub and mix duets will be more accentuated for music experts with high social skill. This pattern of results would suggest that general interpersonal sensitivity moderates the ability of perceiving collaborative aspects in music. Contrastingly, if no differences are found in this comparison it can be concluded that our study did not reveal any influence of social skill over sensitivity to musical collaboration. Better understanding of the links between social skill and sensitivity to collaboration in music can offer a preliminary insight into the cognitive mechanisms underlying the strong social role that music fulfills in our daily lives.

Method

Participants

Forty three participants (18 males, 25 females; mean age = 23 years, *SD* = 4 years) were recruited from the School of Music at the University of British Columbia. In the process of recruiting expert musicians, flyers were posted at the UBC School of Music along with an e-mail that was sent out to all current UBC music students. As an incentive to participate in our study, participants initially received a payment of $20 which was later raised to $30 for their participation in a 45 minute session (the $10 increase in payment was an incentive to recruit more music students to participate in the study). In order to participate, participants were required to have normal hearing and be enrolled at the UBC School of Music. Prior to participation, participants provided written informed consent and were debriefed upon completion of the experiment. The UBC Behavioural Research Ethics Board approved of this experiment.

Stimuli and Apparatus

Three different categories of stimuli were created using jazz duet recordings: (1) live duets, created by recording two musicians playing live to each other in separate rooms, (2) dub duets, created by recording one musician playing to a pre-recorded song without knowing whether they were playing to a live performance or pre-recorded track, (3) studio mixed duets created after the recordings by randomly matching individual instrumental tracks from different takes of the same jazz standard. These categories correspond to a continuum of the degree of collaboration between the two musicians, from two-way interaction in the live duets, to one-way influence in dub duets, to no influence in studio mixed duets.

Three elite jazz musicians were invited to record jazz duets and received $60 per hour for their collaboration. In the creation of the stimuli, jazz musicians played in randomly assigned duets, independent of the conditions of musical collaboration resulting in three different instrument pairings (flugelhorn-guitar, flugelhorn-clarinet, flugelhorn-saxophone) and six different New Orleans jazz standards (Take The A Train, Beautiful Love, Canal Street Blues, Have You Seen Miss Jones, Mr. PC, and Ornithology). The clips were selected from the improvisation sections of the standards. In order to isolate the degree of collaboration as the critical variable, the same tracks of individual instruments appeared in corresponding clips in all three conditions. The length of the clips was defined by the

tempo of the standard and varied between 40 and 60 sec. Musicians were located in separate rooms connected via headphones to a central mixer. Tempo was controlled with a click-track that each musician could hear.

In total, a collection of 105 testing clips (belonging to the improvisation sections) were selected from the recording sessions (35 of each condition: live, dub, mixed). Additionally, six segments corresponding to the jazz standard's head (i.e., first section of the jazz standard that played as written in the score, meaning not improvised) were also selected, one clip for each jazz standard. These clips had durations varying between 15 and 20 seconds and were used as introductions in each trial of our experiment. All recording and editing were conducted at the recording studio at the Department of Music using Macintosh computers running Cubase 7(2012, Steinberg GmbH, Hamburg, Germany).

The experiment for the participants was programmed in MATLAB (2010a, The MathWorks, Inc., Natick, Massachusetts) and the stimuli were played through IMac Intel Core 2 Duo at a constant sound level. A pair of Sennheiser HD 202 headphone was used by participants to listen to the recordings and an HP Calc Pad 100 was used to make the song ratings.

Procedure

The experimenter invited the participants to sit on a couch that was located approximately 90 cm away from the display screen. To start the session, one practice trial was given prior to testing. The experimenter used this practice trial to explain the task to participants. Two listening segments composed each trial. Participants started the trial by listening to an introduction clip (varying between 15-20 seconds). The introduction clips served the purpose of familiarizing the participants with the jazz standard presented in that trial. Introduction clips were indicated in the computer screen by the word "Introduction." After a brief pause (0.5 seconds), participants listened to the relevant clips (varying between 40-60 seconds). Participants were instructed to limit their ratings to the relevant sound clips, marked on screen by the word "Song." After listening to the recordings in each trial, a phrase appeared on screen (e.g., working together), and participants were asked to judge the extent to which they considered the phrase on the screen to match the clip of the jazz duet they had just listened to. At the end of each trial, participants were asked to rate the match between the jazz duet and four phrases corresponding to the dimensions of synergy, creativity, engagement and emotion. Ratings were done using a scale that ranged from 1 ("strongly disagree") to 6 ("strongly agree"). The diversity of phrases used to rate the jazz duets in the dimensions of synergy, creativity, engagement and emotion is a critical feature of our study. Rating phrases were randomly selected for each trial from a set of eight closely matched phrases corresponding to each dimension (four of these phrases were formulated in the positive, and the other four appeared in the negative form). On each trial, an equal number of phrases were selected from the positive and negative columns. The specific phrases used for each dimension are listed in *Table 1*. This variety of phrases was employed so that participants would not fall into standardized ways of responding. Participants indicated their ratings for each phrase by pressing the corresponding number in a keypad. There was no time limit placed on these responses. After the completion of the training trial, participants pressed the "OK" button on the keypad to initiate the testing phase of the experiment.

This phase consisted of 18 trials, six trials of each condition presented in random order. For each trial, jazz duets belonging to the live, dub, and studio mixed conditions were randomly selected from the pool of 105 sound clips. After completing 18 experimental trials, participants were asked to complete the Musical Expertise Questionnaire and the Autism-Spectrum Quotient presented using a web-platform.

Table 1. Phrases used to rate the jazz duets.

	Representative Terms	
Dimension	Positive	Negative
Synergy	in synch	out of synch
	working together	ignoring each other
	has synergy	does not have synergy
	having a conversation	playing to themselves
Creativity	innovative	lacking innovation
	creative	formulaic
	sophisticated	unsophisticated
	masterful	amateurs
Emotion	good vibe	no real vibe
	expressive	dull
	groovy	cannot feel the groove
	energetic	not energetic
Engagement	playing live	not playing live
	toe-tapping	lame
	grabs my attention	fails to hold my interest
	fascinating	boring

To measure individual differences in musician's musical expertise and music listening habits, we designed a Musical Expertise Questionnaire (MEQ) consisting of 15 items. The MEQ was designed to measure a participant's experience with music. Higher scores on questions relating to formal training and music practice reflected expertise. The questionnaire included items about music listening habits (e.g., "How often do you attend live music concerts?"; "Which genre of music do you listen to the most?"). Additionally, the questionnaire assessed musical training in an objective fashion (e.g., music experts had an average of 12.5 years, *SD* = 4.4 of musical training) but also included self-evaluations of expertise (e.g., "Rate your own level of musical expertise"). To further probe musical expertise we had included items that directly related to familiarity with the stimuli in our study (e.g., "How often do you

improvise when you play?"; "How often do you play in a group or with other musicians?"). The complete list of items is listed in Appendix A.

The Autism-Spectrum Quotient (AQ) (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) was used as a measure of social intelligence. More specifically, the AQ questionnaires aim to assess the extent to which an individual with normal intelligence demonstrates autistic traits. The AQ is formed by five sub-scales, each comprised by several items: social skill (e.g., "I prefer to do things with others rather than on my own"), attention switching (e.g., "I prefer to do things the same way over and over again"), attention to detail (e.g., "I often notice small sounds when others do not"), communication (e.g., "Other people frequently tell me that what I've said is impolite, even though I think it is polite"), imagination (e.g., "If I try to imagine something, I find it very easy to create a picture in my mind"). Scores range from 0 to 50 points, with higher points corresponding to a larger number of autistic traits. We used this scale to access our participants' social intelligence due to previous literature relating autistic traits with music perception (Bhatara et al., 2010).

Results

We tested whether different degrees of collaboration in music influenced participants' judgments about the musical pieces. Music experts were able to perceive musical collaboration when asked about synergy but not when asked about engagement, emotion and creativity. These findings were supported by the following analyses. *Figure 1A* shows average ratings of the different jazz-duet conditions (live, dubbed, studio mixed). We performed a repeated-measures ANOVA to analyze the effect of jazz-duet conditions on the mean ratings. This statistical analysis revealed a main effect of duet condition (live, dubbed, studio mixed) over ratings, $F(2,78) = 3.66$, $p = 0.03$. Through more specific analysis of specific dimensions, *Figure 1B* shows the average ratings of the different jazz-duet conditions (live, dubbed, studio mixed) for each of the rating dimensions of (synergy, engagement, emotion and creativity). Repeated-measures ANOVA performed for engagement, emotion and creativity ratings did not reveal any significant effects (see *Figure 1B*). However, Fisher LSD tests indicated that synergy ratings were significantly higher for live duets than for dubbed duets, $t(78) = 1.90$, $p < 0.05$, and studio-mixed duets, $t(78) = 1.78$, $p < 0.05$. No other pair-wise comparisons were significantly different for synergy (see *Figure 1B*). These findings show that expert listeners can perceive collaboration in musical performances. Furthermore, ratings of synergy seem sensitive to collaboration whereas ratings of the other dimensions did not appear to be impacted by the differences between conditions.

Figure 1A. Mean ratings for the three duet conditions.

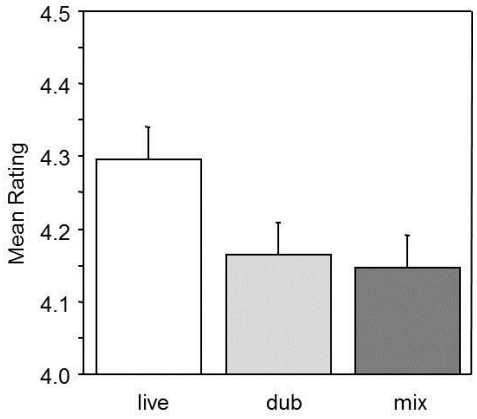
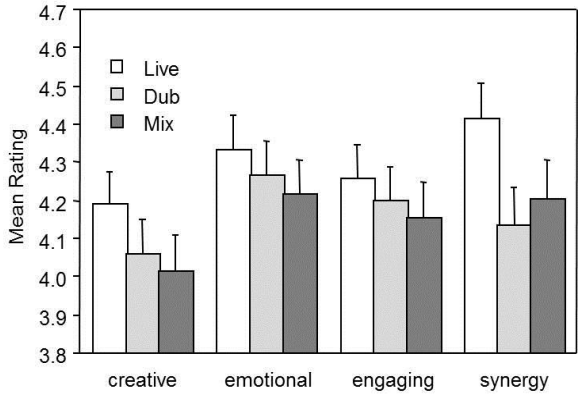


Figure 1B. Mean ratings for the three duet conditions in the dimensions of creativity, emotion, engagement and synergy.



An additional question we addressed was whether differences in participants' social aptitude influenced the perception of collaboration in the jazz-duets. *Figure 2A* shows the relationship between the participants' total Autism Quotient score and their sensitivity to musical collaboration (average live ratings minus dub duet ratings). A Pearson product- moment correlation coefficient was computed to assess this relationship. The statistical analysis revealed a positive correlation between sensitivity to musical collaboration and the participants' total Autism quotient score$r(41) = 0.325$, $p < 0.04$. This suggests that there is a tendency for individuals to display heightened sensitivity to musical collaboration whenthey exhibit more autistic traits. We further probed the correlations between sensitivity to musical collaboration and the five sub-scales of the Autism Quotient Scale (social skill, attention switching, attention to detail, communication, and imagination). Results of this analysis showed a positive correlation between attention to detail scores (mean = 6.1) and the participants' sensitivity to synergy, $r(41) = 0.346$, $p < 0.04$ (see *Figure 2B*). No other significant correlations were found. These results suggests that higher AQ scores were associated with greater sensitivity to differences between duet conditions.

Figure 2A. Scattor plots representing the relation between sensitivity to synergy scores and autism quotient spectrum. AQ total. Each dot represents one participant.

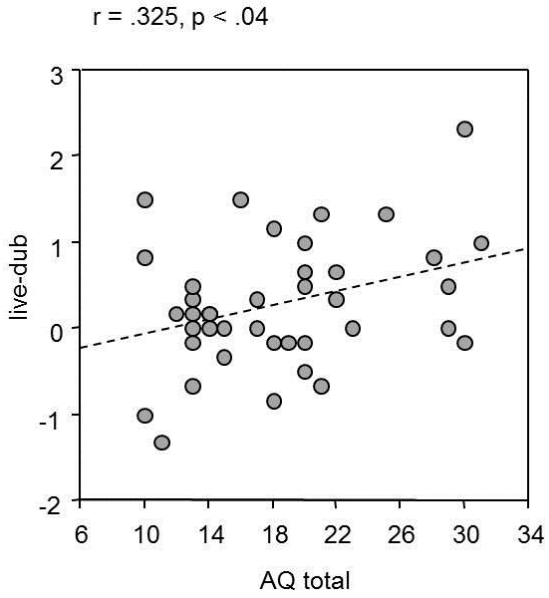
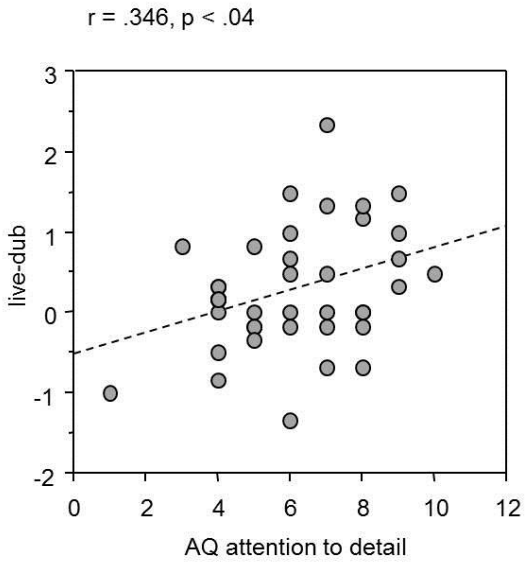


Figure 2B. Scattor plots representing the relation between sensitivity to synergy scores and autism quotient spectrum. AQ Attention to Detail. Each dot represents one participant.



Discussion

In this study, we measured whether expert musicians were sensitive to varying levels of collaboration in musical performances. To test this, we created jazz duet recordings which differed in their musical cooperation from live duets (two-way feedback) to dubbed duets (one-way feedback) to studio mixed duets (no feedback). Participants listened to these duets and rated the recordings on four dimensions of musicality: synergy, creativity, emotion and engagement.

Our main finding in this study is that expert musicians were able to detect collaboration in music when specifically asked to rate the duets according to their synergistic properties. This pattern of results did not fully support the central hypothesis in the study, which stated that expert listeners would show sensitivity to collaboration in musical performances when asked to score the jazz-duets in all dimensions of musical perception. In the study by Pesquita et al. (2014), which used a non-musical expert sample of participants, participants ranging from no musical expertise to high musical expertise were sensitive to the four dimensions music: synergy, emotion, engagement and creativity. In comparison to that study, the current results suggest that expert musicians are more sensitive to certain dimensions of music, namely, the synergy dimension of musical collaboration.

The finding that the perception of musical collaboration in music experts was confined to the specific evaluation of the synergy dimension suggests that expertise allows one to be precise when making judgments about music. This precision likely resulted in higher synergy ratings as this dimension most closely related to our stimuli manipulation. This is also consistent with previous literature showing that experts are more analytic and have finer grained categories than novices. For example, when compared to humanities students, science students tend to sort descriptions of real-world phenomena according to their causal structure (e.g., negative feedback vs. causal chain) rather than broader and more inclusive content domains (e.g., economics vs. biology) (Rottman, Gentner, & Goldwater, 2012). Causal systems categories are defined by possessing common causal structure, irrespective of the particular domain (Rottman, Gentner, & Goldwater, 2012). Insight about causal structures is suggested to be facilitated by science training. Furthermore, the hypothesis that domain-based sorting would shift to a more causal sorting with increasing expertise was confirmed in the study. Similarly, a study comparing medical image categorization by novice and expert image users showed that experts use more specific image attributes than novice image users (Litchfield, Ball, Donovan, Manning, & Crawford, 2010). Yet another illustration of this broad phenomenon comes from studies showing that differentiation of taste components in wine increases with wine tasting expertise (Urdapilleta, Parr, Dacremont, & James, 2011).

In the music domain, Gromko (1993) showed that music experts tend to encode local characteristics of music (e.g., themes, rhythm, harmony) while novices focus on global qualities (e.g., louder/softer, slower/faster, higher/lower). The studies mentioned above share the underlying conceptualization that proficiency in a specific field harnesses experts with perceptual and categorical schemata that allow them to make more precise and detailed judgments about their subject

matters. This conceptualization is consistent with our finding which suggests that music experts may utilize specific differentiation for synergy qualities in the jazz-duets that varied in the degree of collaboration between musicians. An alternative explanation to this finding may be that experts were less sensitive to the categories of emotion, engagement and creativity. Thus, the higher ratings of synergy may be attributed to experts' insensitivity to the remaining categories.

Our second hypothesis was that empathizing traits (i.e., the capacity to respond to feeling states of other individuals) would moderate experts' sensitivity to collaboration in music, (i.e., high empathizing drive would result in higher sensitivity to collaboration in musical performances). This hypothesis follows from the observation that music collaboration is a specific type of social interaction, and therefore the general aptitude in empathizing with others might facilitate the perception of collaboration in music. The present results in our study do not support the proposed hypothesis, as no correlation was found to occur between the sensitivity to collaboration in music and participants' scores on the empathizing sub-scales of the Autism Quotient (communication and social skill). Instead, we found a positive correlation between systematizing traits (i.e., the capacity to respond to regularities of objects and events) and sensitivity to collaboration in music. In particular, self-reported attention to detail was positively correlated with sensitivity to collaboration in music. In contrast to this finding, Pesquita et al. (2014) observed that for non-expert participants, sensitivity to collaboration in music was modulated by their empathizing abilities (in specific social skill traits) rather than by systematizing traits.

The characteristic of high attention to detail has a more general tendency for systemization in the autism spectrum (Simon Baron-Cohen, 2010). High systematizing tendencies, however have been seen outside the spectrum disorder in physics students as an example (Baron-Cohen et al., 2001). Kretz, Schubert, and Mitchell (2008) measured empathizing and systemizing as specific cognitive traits existing in professional, amateur and non-musicians. The results suggested that proficiency in music performance is associated with a cognitive style that favors the perception of musical structure and other aspects that relate to the technical realization of music, whereas lay-persons' music perception is largely based on emotional appreciation of the music qualities (Kreutz, Schubert, & Mitchell, 2008). The present findings that music experts with higher levels of attention to detail showed an increased sensitivity to musical cooperation is thus consistent with these related findings linking systemizing traits to musical training (Bhatara et al., 2011; Kreutz et al., 2008).

Lastly, results in this study revealed that expert musicians with higher levels of social aptitude tended to score all duets conditions higher than novices. At first glance, this result appears counter-intuitive because expertise is commonly associated with outstanding performances in relevant domains (Ericsson, 2005). A possible explanation is that listeners who are both highly social and musically trained may actively seek to create social interpretations for the music. This interpretation is consistent with previous evidence that others may process ambiguous information in ways that align with their desires, sometimes referred to as wishful seeing (Dunning & Balcetis, 2013). Another interpretation of this surprising result is that

these expert listeners have a tendency to appreciate both the expected and unexpected products of musical cooperation. It is therefore possible that musical experts may value the miss-alignments between non-cooperative music as an expressive choice.

Further investigation on the potential underlying systematizing and empathizing mechanisms involved in the perception of collaboration in music should focus on using music pieces varying in three orthogonal domains: collaboration, technical complexity, and emotional induction strength. Variations in aspects such as chords, harmony, and rhythm could be used to manipulate technical complexity whereas variations in timing and amplitude can be used to manipulate the emotional induction strength (Bhatara et al., 2011). In this case we predict that lower technical complexity range should dampen the perception of collaboration in music by experts, whereas less emotionality in the music should make more difficult for non-experts to perceive collaboration in music. The potential pattern of these results would confirm our findings that experts apply their technical and analytical skills to perceive collaboration whereas non-experts use their social skills to perceive collaboration in music.

An issue that remains for future research concerns whether the findings obtained in using jazz stimuli can be generalized to different music cultures and communities (e.g., classical, pop, tribal music). Studying the perception of collaboration in music in other genres of music will lead to a better understanding of the extent to which musical experts' can perceive musical collaboration and if our findings can be applicable to other musical domains.

In conclusion, the present study provides novel evidence about the role of expertise in perceiving social collaboration in musical performances. Our findings contribute to the understanding of the interface between the cognitive mechanisms of music appreciation and music as a cultural technique and as a language for social interaction.

Appendix A

Music Training Questionnaire

1. How often do you listen to music?
2. Which genre of music do you listen to the most?
3. How often do you attend live music concerts?
4. How often do you listen to JAZZ music?
5. What type of JAZZ do you listen to the most?
6. How often do you attend live JAZZ concerts?
7. How do you classify your music proficiency?
8. Do you have training as a musician?
9. How many years of music training have you completed?
10. In which genre of music are you trained?
11. Which instrument do you play?
12. How many hours per week do you practice?
13. How often do you improvise when you play?
14. How often do you play in a group or with other musicians?

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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The Relationship between Social Support, Life Quality, and Survival Rates of Breast Cancer Patients

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Abstract

This literature review examines five studies designed to investigate the relationship between social support and network, the quality of life and the survival outcomes of breast cancer patients. Breast cancer was one of the major cancers Canadian women were diagnosed within 2012. The studies discussed are primarily longitudinal studies with large samples that enabled researchers to closely follow mortality statistics, thereby highlighting the associations between breast cancer survival, mortality rates and social support. Social support is known to provide benefits during negative life events and aids in buffering against the unpleasant effects of an illness. Participants rated and responded to questions regarding the forms of social support received, the extent of their social networks and quality of life factors, such as their satisfaction in various health domains and level of emotional well-being. The results of the studies emphasised the significance and wide-ranging impact of social support on patients' quality of life across the mental, emotional and physical domains. On the one hand, social isolation was associated with higher risk of all-cause and breast cancer mortality while social burden and the level of strain experienced by participants were associated with increased breast cancer mortality. On the other hand, a high level of social support received was related to higher quality of life and better survival outcomes. The results also suggested that social support worked through emotional and cognitive pathways that lead to positive health outcomes over time.

Keywords: *social support, survival rate, breast cancer*

Breast cancer, despite it not being a modern age disease, has a more pronounced effect on the lives of women than any other illness these days. It is one of the four most frequently diagnosed cases of cancer, along with lung, colorectal and prostate cancers (Canadian Cancer Society, 2012a). Nevertheless, between 1998 and 2007, the mortality rates of breast cancer in females have declined by an average of at least 2% per year. There is still an optimistic difference between the number of new cases and

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deaths due to breast cancer; for example, estimated death rates for each age group accounted for less than 20% of the number of corresponding new cases for females between the age of 20 and 70. Survival after a breast cancer diagnosis is now more prevalent with advances in medical science reducing the lifetime probability of females dying from breast cancer to 3.5% (Canadian Cancer Society, 2012b). The future may appear promising for our present generation of breast cancer patients; yet, living with the aftermath of a diagnosis presents a number of challenges and uncertainties. The chronic nature of the illness results in daily physical, emotional, mental and social issues that must be addressed in the lives of these vulnerable women. Therefore, in this paper, we examine whether social support is associated with the quality of life and survival of women with breast cancer.

General and different forms of social support provided by a patient's immediate and extended network were studied. It is important to understand that receiving social support is a subjective experience – the experience represents different meanings for individuals with different needs. A gesture or verbal remark can be interpreted as offered with varying intentions, depending on the person to whom it is directed and the circumstance(s) under which the interaction takes place. In the following studies, we examine the forms of support which met the specific needs of breast cancer patients. There are many pathways through which social support can influence breast cancer patients' overall prognosis. Even when a definitive statistical conclusion cannot be drawn in one of the studies, significant correlations have been observed between social support and the relevant variables under study (Lewis et al., 2001; Waters, Liu, Schootman, & Jeffe, 2012). The majority of longitudinal studies discussed in this article were conducted over a period which ranged from six months to more than 10 years. Since breast cancer patients have better chances of survival than ever, it is fitting that we examine both the long-term and short-term impacts of social support.

Salonen et al. (2012) touched on the effect of social support on the changes in the quality of life among newly-diagnosed breast cancer patients recruited from two Finnish hospitals. Research participants fell within a wide range of 31 to 75 years of age with a mean age of 57 years. There were a total of 164 participants who had undergone surgery and were quasi-randomized into an intervention and a control group. Participants were first followed at one week and then six months after their surgeries. The intervention group received individualized support and informational assistance by a physiotherapist through telephone at baseline and a second face-to-face meeting in a clinic, at six months post-surgery. During each follow-up, participants completed two quality of life questionnaires: the Ferrans and Powers Quality of Life Index (QLI-CV) and the European Organisation for Research and Treatment of Cancer Quality of Life Group Core Quality of life questionnaire (EORTC QLQ-BR23). Items in the QLI-CV questionnaire measured patients' satisfaction in the domains of health and functioning, socio-economic, psychological/spiritual and family. The EORTC QLQ-BR23 is more focused on the patient's disease symptoms and functioning. The participants also completed a third questionnaire which measured social support received from social network and nurses. It was based on Kahn's theory of social support (1979), which conceptualised three different aspects of social support: affect, aid and affirmation. Participants rated these three

areas of social support as offered by their social network and nurses separately.

The responses obtained from participants in the study showed that the major sources of support for the participants were their spouses, children and friends. Less than 15% of participants in the intervention and control groups identified a healthcare professional as part of their social networks at one week and six months after surgery. The most social support received in the form of affect one week after surgery decreased significantly within six months. Aid and affirmation received from nurses decreased with time for the intervention group but increased for the control group; however, the scores of the intervention group at baseline one week after surgery were higher than those of the control group. The women in both groups had a fairly stable social network within six months after operation, despite the greater opportunity for the intervention group to develop new connections with nurses or healthcare professionals. With respect to the effect of social support on the quality of life of patients, more affect received from their network increased the risk of negative changes in both global QLI and the domains of health and functioning. Krishnasamy (1996) reasoned that patients with breast cancer may feel helpless and dependent as a result of their inadequate understanding of the meaning of social support, which led to its negative impact on their quality of life. This could have caused them to be overwhelmed with the nature of excessive attention previously not offered, thereby inducing their sense of heavy reliance on others and reducing the sense of personal control over their situation and self-efficacy. In the event of having an illness, patients may perceive that they could benefit more from informational support related to breast cancer which they would not have known about in the past. Emotional support could have been deemed second place in the face of a life-changing surgery and its complications. Or, as the authors suggested, the inadequate understanding of the meaning of social support by patients could have led to the authors' inability of obtaining a clearer effect of social support. Support in the form of affirmation and aid were more centred on the concerns of patients' health and illness (for example, rehabilitation options and physical self-care in the home respectively) and addressed more specifically to the unique needs of patients' situation. The authors also discovered that, with increased aid provided by nurses, the risk of negative changes in the patients' sexual functioning was decreased, as indicated by a lower odds ratio of 0.87 for the risk to occur when compared with affect and affirmation. This aspect of social support in helping to alleviate one of the likely unpleasant effects of breast surgery is worth noting; however, the results indicated that aid received from nurses decreased at six months after surgery, especially for the intervention group. More research is required to determine the long-term positive effects of aid received and the pathway through which it improves the physical sexual dysfunction of breast cancer survivors.

The effects of receiving social support differed from that of providing social support to others while living in a state of compromised health. In another longitudinal study, Kroenke et al. (2012) examined the negative effects of caregiving on a larger sample size (n = 4,530) of women with invasive breast cancer, looking beyond the women's short-term change in quality of life to assess survival rates. Post-diagnosis mortality during the period of this study has a record of 190 deaths due to breast cancer out of a total of 354 deaths. The multi-ethnic

sample of participants were post-menopausal and fell between 50 and 79 years of age. The duration of time of follow-up on the participants ranged from zero to 14.4 years. Participants were asked about marital status, frequency of involvement in religious or club meetings, and the number of their children and first-degree relatives. Information on social support received was assessed based on the Medical Outcomes Study (MOS) questionnaire, which measured items such as emotional support, tangible support and positive interaction. Social burden were assessed by asking if participants had caregiving responsibilities and social strain was measured by asking about the number of people in the participants' social circle who affected them negatively. The analyses suggested that women with larger relative networks were more likely to be married, have more children at a younger age, be involved in caregiving and religiously active and more likely to have had a mammogram within the recent two years. Non-white participants were more likely to have larger relative networks due to their collectivistic culture. With respect to the influence of social support received by women, marriage was associated with lower all-cause mortality, but only for those who reported higher than median levels of support. Higher breast cancer mortality was related to marriage for those who reported lower than median levels of social support. These factors could be attributed to the lack of buffer against internal marital conflicts that may be provided by high levels of social support from network members outside of marriage. It was also discovered that the greater number of first-degree relatives was positively related to both all-cause and breast cancer mortality for caregivers who experienced high levels of social strain. This result confirmed the researchers' hypothesis that high levels of social burden will lessen social benefits experienced by women. One of the limitations of this study is that it placed greater emphasis on the presence of the participants' intimate partners and those who are closely blood-related and omitted the impact of friends on the outcome of their diagnosis and illness. The authors mentioned that a post hoc analysis showed that the number of siblings of those women with high levels of social burden could have accounted for the positive relationship between their relative network size and mortality. Obligations to immediate relatives based on acknowledgement of kinship that are tough to avoid could have caused greater strain on the participants' health and ability to cope with the aftermath of breast cancer diagnosis, be it physically or psychologically. Future studies should investigate whether such negative impact was more pronounced on non-white ethnic groups since they tend to have larger social networks.

Kroenke, Kubzansky, Schernhammer, Holmes, and Kawachi (2006) examined the effect of the size of one's social network in addition to social support on the survival of women diagnosed with stages one to four breast cancer. The participants were diagnosed between the year 1992 and 2002 and mortality figures until the year 2004 were obtained. There were a total of 2,835 participants recruited from the Nurses' Health Study in the United States. The researchers hypothesized that better social networks and the presence of greater socio-emotional support would benefit the survival of women after having breast cancer. Participants, who fell between the age range of 46 to 71 in 1992, responded to social network questions at four-year intervals until 2000, both before and one to four years after diagnosis. The social network questions were provided by the Berkman-Syme Social

Networks Index (SNI) self-reported questionnaire which is a composite measure that assessed participants' marital status, the scope of their social and community networks, and frequency of contacts with closed ones. The researchers then categorised the respondents into four levels of social connection: socially isolated, moderately isolated, moderately integrated and socially integrated. Changes to the women's social networks before and after diagnosis were also assessed. The presence and availability of a confidant, a person with whom one could share personal matters and be assured that they would not be easily or unnecessarily disclosed, served as a measurement for one's social-emotional support. It was discovered that having a confidant did not correlate with the scope of the participants' social networks.

The duration of follow-up on the participants was between zero and 12 years, depending on the length of one's survival after breast cancer. Of the 224 participants who died, 107 of the deaths were due to breast cancer. In the adjusted analyses of the results, women who were socially isolated before diagnosis had a higher risk of all-cause death as well as a doubled relative risk of mortality due to breast cancer. This finding also applies to analyses of social networks after diagnosis. Pre-diagnosis religious and community activity participation as well as having a spouse did not present association with survival as opposed to the previous study. However, participation in activities post-diagnosis predicted lower risk of mortality. The beneficial effect of marriage was detectable when a high level of support was offered to the participants (Kroenke et al., 2012). The presence of an interaction with a confidant was not related to women's survival. Interpretations of the role of, and interaction with a confidant may be varied and subjected to a person's biases and circumstances, thus presenting a challenge in the accuracy of the measurement irrespective of the extent of one's social network. It is not entirely unexpected that a strong link between socio-emotional support and survival outcome was not discovered, as it could be the primary interest of the researchers to place greater focus on the social network variable. Hence, the results showed that participants with close relatives, friends or living children had decreased risks of all-cause mortality and breast cancer mortality. The risk was more pronounced for breast cancer mortality than that of all-cause mortality for those with no close friends in comparison with participants who have ten or more close friends. The results also showed that the hazard ratios for breast cancer mortality were nearly double that of all-cause mortality at 4.06 compared with 2.20. This means that the risk of death which results from breast cancer is about twice that which is due to any cause, under the condition that one is socially isolated compared with having many friends. Such results support the notion that the most important source of social support for women is usually not their spouses. In another study, it was found that older women relied more on members of their larger social networks and experienced less satisfaction from their marriages than men (Antonucci and Akiyama, 1987). Women may relate better with those who are of the same sex since it is easier for them to understand the breast cancer experience. A study by Harrison, Maguire and Pitceathly (1995) which compared gender differences found that the likelihood that newly diagnosed female cancer patients were more likely to confide in their friends or relatives, either including or excluding their spouses, were more than twice that of male cancer patients.

In addition, participants having at least six living children had decreased mortality risks. This suggested that older women's relationship with their children may provide more health protective benefits than their marriages.

Another limitation of this study was that the authors determined the significance of socio-emotional support by assessing only the availability and frequency of contact with a confidant. This could be an inadequate representation of social support, unlike the previous study conducted by Salonen et al. (2012), which had categories of questions which referred to the three different aspects of social support: affect, affirmation and aid. Kroenke et al. (2012) also comprehensively measured nine different forms of social support received by participants. Nonetheless, instrumental and informational support, which are important and required by breast cancer survivors especially in the event of a surgery, were not given in-depth discussion by both studies.

The above three studies attempted to trace more direct effects of social networks and support on the quality of life and survival of participants. Waters et al. (2012) sought to identify both the influence of and interactional relationship between perceived social support and worries about cancer progression. This study presented an attempt to consider the possibility of social support in moderating the association between worry and quality of life. The study was carried out at intervals following a surgery undergone by 480 women diagnosed with ductal carcinoma in situ and early-stage invasive breast cancer. Participants completed four computer-assisted interviews through telephone at four to six weeks, six months, 12 months and 24 months intervals. The RAND 36-Item Health Survey 1.0 measured the quality of life of participants in domains such as physical functioning, emotional well-being and role limitations. The participants' worry about illness progression was assessed by asking whether she worried that her condition would get worse in the past seven days. The 19-item Medical Outcomes Study Social Support Survey measured the women's perceived availability of social support. In the cross-sectional analyses at six months after surgery, there were associations between worrying about cancer progression and lower quality of life on most subscales. Higher social support was related to better scores in domains such as emotional health and social functioning. A negative correlation was also observed between social support and worry. The authors also found an interaction between worry and social support in the area of emotional well-being for women with lower social support. In the longitudinal analyses, lower social support and higher worry at six months post-surgery were associated with lower general health six months later. Adjusted analyses also indicated a significant interaction between worry and social support on emotional well-being; however, examination of the means further suggested that participants who worried and experienced low social support "might have had better emotional well-being" compared to those who did not worry (Waters et al., 2012, p. 64). The assessment of worry at six months after treatment were also less-varied, with a majority of participants reporting that they did not worry at all as opposed to the less than 4% of all women who worried "quite a bit" or "very much" (Waters et al., 2012, p. 66). As time passed, women slowly worked up to their higher scores on quality of life at two years after surgery for those who worried and those in the lower quartiles of social support. It can be said that the effects of worry about cancer progression and perceived availability

of social support on the quality of life of breast cancer survivors were more pronounced over the period of time of at least a year post-surgery, especially in association with patients' emotional and social well-being. One possibility is that a patient can be generally contented with her present emotional well-being but still be unsuccessful in getting rid of worries as she realizes that social support may not resolve her situation. Whether worry first precedes emotions as an unpleasant intrusion into one's thought life so that a cause and effect relationship can be inferred is worth a consideration – this leads us to the next study to be discussed. Further research is needed to better understand other relevant pathways through which the positive factor of social support operates; for example, in improving one's overall mood and affect, and how support mutually works with such process to benefit the state of one's health.

Lewis et al. (2001) examined the moderating effect of appraisal social support on the relationship between cancer-related intrusive thoughts experienced by breast cancer survivors and their quality of life. Lepore and colleagues (1996) argued that the disclosure of one's thoughts and feelings to members of social networks who are receptive and supportive is important to emotional health following a traumatic event. Similarly, Lewis et al. (2001) focused on measuring such disclosure by participants and the availability of significant other(s) in making the interaction possible (i.e., one's appraisal social support, cancer-related intrusive thoughts and quality of life). The study included 64 participants aged 30-81 who had been treated at a regional cancer centre. The range of years since last treatment was from 1 to 15, with a mean of 6.7 years. The participants were contacted by telephone for interviews. The Interpersonal Support Evaluation List (ISEL) measured one's appraisal social support while the Medical Outcomes Study, short form (MOS-SF) that assessed quality of life on eight different domains including physical functioning general health, social functioning, emotional role functioning and mental functioning. The third Impact of Events Scale (IES) is a self-report measure that addressed the participants' intrusive thoughts and their avoidance in relation to breast cancer and its treatment. The Intrusion subscale was included to measure the area of cognitive processing of the event. The study results suggested a low frequency of intrusive thoughts among participants (M = 4.59 on a scale of 1 to 16). However, a "significant minority" of the participants seemed to encounter at least one intrusion symptom in the recent three weeks. The levels of perceived social support were reported to be high (M = 8.23 on a scale of 1 to 10). Both the levels of physical and mental quality of life reported by participants, which were summary scales obtained from MOS-SF-36, did not differ greatly from the normative data supplied by authors who developed this measure; however, those with low perceived social support and high frequency of intrusive thoughts reported a significantly lower mental quality of life. The results also suggested a significant and positive correlation between a higher level of perceived appraisal social support and mental quality of life. The levels of intrusive thoughts experienced by participants were not associated with perceived appraisal support. Regression analyses of data obtained showed that higher frequency of intrusive thoughts extended their influence beyond the cognitive domain to lower one's physical quality of life. The association was moderated by one's level of perceived social support as discovered to be significant by the

fourth regression model of interaction between intrusive thoughts and social support. Income and social support positively affected mental quality of life while intrusive thoughts had a negative association with this domain. A similar result was obtained in analysis of the interaction effect of intrusive thoughts and social support, supporting that the association between one's mental quality of life and experience of intrusive thoughts was moderated by level of perceived social support. For participants with low perceived social support, intrusive thoughts related negatively with their physical and mental quality of life but not for women with high social support. A possible explanation for this finding is that high levels of appraisal social support could have served as a buffer against the consequences of the women's high frequency of intrusive thoughts. Another observation is that given that none of the participants experienced a cancer recurrence and there was a mean of more than five years since last treatment, the result that most of them would report a low frequency of intrusive thoughts is not unexpected, especially when they also encountered high levels of perceived social support and scored high on quality of life assessments. Such considerable length of time after treatment may make up for the limitation of this study being non-longitudinal in nature. The participants could have developed more optimism in regard to their health and outcomes of breast cancer experience as a consequence.

As social support is a highly subjective and variable form of human interaction, it is only expected that no study can exhaustively or comprehensively measure its impact across every domain of life – a reality which explains the inadequacy of the above five studies to draw definite and consistent conclusions from their findings. Similarly, there is no single universal means of objective measurement that can accurately quantify social support received by any person; however, despite the constraints of response biases posed by questionnaires, it can be inferred that social support appears to enhance the quality of life and survival of women with breast cancer when social strain and burden are minimal. Contrary to popular view, marriage does not always benefit breast cancer patients under all conditions and it would be better to distinguish between the support provided by spouses and other members of one's network, in particular the patients' children, in the measurements of future studies (Kroenke et al., 2012). The more positive survival outcome for women with greater number of children and close friends suggests that the benefit of social support is also dependent on the specific roles of network members who provide social support. Social support also interacts with participants' health and course of the disease; for instance, it acts as a buffer against the negative outcomes of cancer particularly mental quality of life. The more significant findings obtained are that the women's extensive social networks and high levels of social support received did impact their survival, which were associated with lowered risks of all-cause and breast cancer mortality (Kroenke et al., 2006). There are discussions of social factors working positively through many biological pathways, such as the immune and neuroendocrine systems as hormones play a significant role in the disease, whether prior to or following diagnosis. For example, a stressful event of difficult caregiving is associated with negative effects on nearly all functional measures of one's immune system which are more pronounced in the presence of a disease (Taylor and Sirois, 2012). Turner-Cobb (2000) found that women with metastatic breast

cancer who reported lower social support had higher mean immunosuppressive hormone levels. In two of the studies discussed, breast cancer deaths accounted for about half of all cases of mortality of the participants and, thus, such illness exacerbated under social pressure and obligations to close ones which participants perceived needed to be fulfilled continuously, even for a lifetime (Kroenke et al., 2006; Kroenke et al., 2012).

It is also worth mentioning that the large sample size of participants in both studies is their strength in assessing survival outcomes. They also caution us against the dark side of social experiences encountered (i.e., social burden that took a toll on the process of recovery from and coping with breast cancer). Nevertheless, the positive effects of social support received were not only associated with better emotional health and related quality of life, but also went further in influencing one's physical sexual functioning (Salonen et al., 2012). In consideration of this outcome and the moderation of intrusive thoughts, social support could possibly work as a beneficial mediating agent between one's mental and physical well-being and quality of life. Like the placebo effect, there may be unrestricted numerous interplays between our cognitive, nervous and other physiological pathways which combine to reduce unpleasant symptoms of an illness (Taylor and Sirois, 2012). We have also considered two of the indirect pathways through which social support can mediate a person's aspects of wellbeing (i.e., worry and intrusive thoughts, to which patients with life-altering illness are vulnerable). Although it is challenging to trace the moderating effect of social support on the relationship between worries about cancer progression and quality of life, each has relevant correlations with the quality of life of participants, especially emotional and social well-being, and the effects of initial low social support were carried forward to a later point in time (Waters et al., 2012). Kok et al. (2013) identified the perceptions of social connections as a mechanism in mediating one's positive emotions and physical health. In addition, Huppert (2005) mentioned that positive emotions also indirectly influence health through one's cognition and behaviour. Such cognitive influence could in turn affect one's appraisal of experience and cancer outcomes. The promising finding of the interactional effects between appraisal social support and cancer-related intrusive thoughts on women's quality of life sheds light on one of the pathways through which social support works positively for their health benefits, providing one of the options in dealing with the mental and emotional distress produced by the illness (Lewis et al., 2001). Further research of such kind is necessary in order to boost the effectiveness of interventions. Additional research can also provide more information to breast cancer survivors, their loved ones and healthcare providers to offer the right kind of support and care, when possible over a longer duration of time post-surgery and/or treatment. The results can make living with the disease and longevity a more positive and less burdensome experience – one that does not compromise one's quality of life.

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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The Association between Increased Stress and Seizure Occurrence among Epileptic Patients

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Abstract

This literature review examines the differing effect of stress, a psychosocial factor, on a health problem that is becoming increasingly widespread – seizure frequency in epileptic patients. Five studies are discussed, in which researchers addressed the question of whether or not stress is associated with increased seizure occurrence among epileptic patients of various ages, from varying backgrounds, and within different life circumstances. In addition, these studies were conducted during contrasting time periods. All studies span a total of 28 years, with the earliest study being published in 1984, and the most recent being published in 2012. The combined results of these five studies suggest that stress can contribute to heightened seizure frequency; however, this depends on the individual. Implications of this research, and suggestions for future direction on research in this area are also given.

Keywords: *epilepsy, epileptic, stress, patient, seizure*

Epilepsy is an incurable disease that impacts 1 in every 100 Canadians (Sirois and Taylor, 2012, p 25). It is the most common *serious* neurological disorder in the world (Brodie et al., 2012). While this disease cannot be cured, it is important to identify precipitants (i.e., causes), potential triggers, and factors associated with the seizures experienced by those who have it. In this paper, I will review several studies that have found stress to be a common predecessor of seizures. From a psychological perspective, the examination of psychosocial factors with regard to seizure frequency may lead to an increased understanding of epileptic seizures and their causes. Although there are many psychosocial factors that can be investigated, there is one in specific that often affects all species in varying degrees of severity. Perhaps *stress*, which can be an effect of a negative or positive event (Butcher, Hooley, & Mineka, 2013), is a psychosocial factor that acts as a contributing factor to seizure occurrence.

The earliest study published in 1984 (Davis and Temkin) provided results that

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researchers in Washington found after investigation of daily activities, saliva samples, and questionnaires, of 12 severely epileptic patients. In specific, this three-month study had participants complete a Life Events Survey, a Hassles Scale, a Daily Events Schedule, and a Daily Seizure and Tension Log. The mean age of these participants was 33 years.

After being trained on how to keep record of any medications taken, illness, alcohol intake, and sleep patterns, patients tracked these over the next three months and called in each evening to verbally report the information, as well as mailed in their logs at the end of each week. Each patient was also told on a random day each month to collect a saliva sample and mail this in as well; this allowed researchers to examine the levels of antiepileptic drugs in each patient's system.

By analyzing the daily logs, Davis and Temkin were able to note that on days that were "low stress" for patients, there were fewer seizures present than there were on "high stress" days. Moreover, they found a positive association between stress and seizures; seven out of the 12 patients experienced increased seizure occurrence with an increased presence of stress.

Although the results of this study suggested that perhaps more stress is associated with more seizures, it only made use of 12 severely epileptic patients; these 12 patients may not have been accurately representative of other epileptic patients that were not present in the study. Moreover, the short three-month duration of the study may have led to findings that may not have been present if it had been longer.

Contrastingly, a study published in 1994 by researchers in Minnesota (Hauser, Leppik, Paik, Nadel, Neugebauer, & Susser), obtained results from 46 epileptic patients, across a much longer time period of nine-months. This study did in fact share some similarities with the study previously discussed. The mean age of the participants was also in the 30s range, with the mean age being 39 years. In addition, participants were also required to keep records; patients kept a diary in which they recorded sleeping and waking times, time of seizure attacks, and females also recorded menstrual status. These diaries, provided by the experimenters, also included 49 pre-set life events; patients were required to choose any life event that occurred throughout the course of each day, write the time of occurrence, and rate the intensity of the event. An example of a life event that was pre-listed in these diaries would be a fight with a family member or a promotion at work. The diaries were mailed in weekly, and, similar to the 1984 Washington study, phoned in daily.

At the conclusion of this study, researchers found that unpleasant or stressful events increased the frequency of seizures in only five patients. However, with statistical tests, it was found that there did exist a large association between unpleasant events and seizures; interestingly, this finding was specific only to men. In spite of this however, this may have been accounted for due to the fact that there were less men in the research pool.

A study published in 2000 helped demonstrate that perhaps had there been more women in this 1994 study, the results would have been different. Four hundred epileptic patients in Virginia answered questionnaires about their possible seizure precipitants (Fountain, Frucht, Quigg, & Schwaner, 2000). Among these participants, 30% (i.e., 120 patients) cited stress as a trigger of their seizures (i.e., it became more difficult to control the seizure when stress was present), making it the most common

trigger chosen from the list provided by researchers. With regard to the 1994 study, more females than males chose stress as a trigger for seizures. Due to this finding, it can be suggested that women do in fact experience stress as a seizure precipitant, as was suggested of men in the 1994 study.

The above studies consisted of epileptic participants who were all adults. However, epilepsy affects all ages (Brodie, Kwan, & Schachter, 2012). In 2012, researchers in the Netherlands (Braun, Jansen, Joëls, Steinbusch, & van Campen, 2012) published a study on *childhood* epilepsy. One hundred and fifty-three parents of children with epilepsy responded to questionnaires about the patterns of seizures and stress in their child. In addition, researchers examined the information within each child's medical file, to note the age of the onset of the disease, information from EEG recordings, and any other information relevant to the study. Ages of the children studied ranged from two years old to 16 years old.

Intriguingly, stress was the most highly chosen trigger for seizure occurrence by parents. One may argue that this study was partially flawed, giving way to the parents' perception of their child's stress rather than the child themselves, however, 51% of the parents reported their children were sensitive to stress. Moreover, 39% of parents stated seizures increased when their child was under stress. What was more interesting was that children who reportedly had an increased number of seizures during stressful periods, had experienced a larger number of negative life events. Researchers suggested this could mean that for children, experiencing negative life events could potentially induce a larger than average response to daily stressors, causing an increase in the chance of having epileptic activity in the brain. Currently, a diary study is underway in which children and parents together are tracking daily events, so as to have less interpretation and more consistency.

Stress can be caused by daily hassles, or large-scale circumstances and events. The studies from 1984, 1994, 2000, and 2012, directed their focus on stressful daily hassles. However, also examining the role of stress as a seizure precipitant when it was induced by a large-scale circumstance is also crucial, as something such as a natural disaster can have more lasting negative effects on an individual than a daily hassle may. This is exactly what researchers in Israel did with epileptic patients who survived the Persian Gulf War (Cohn, Korczyn, Neufeld, & Sadeh, 1994).

According to the *Stress Theory,* out of those who are exposed to catastrophic circumstances, it is estimated that approximately 25% will be able to cope without being impaired (Pasnau and Fawzy, as cited in Cohn et al., 1994). It has been suggested that this applies to epileptic patients and their seizures (Pasnau and Fawzy, as cited in Cohn et al., 1994). The Persian Gulf War, although short, was vigorous (Sadiq and McCain, 1993). A study done not long after this catastrophic event focused on the seizure frequency resulting from stress that was caused by the Gulf War (Cohn et al., 1994). One hundred epileptic patients, all of whom had epilepsy before the war began, answered questionnaires about the frequency of their seizures both before and after the war. The mean age was 34.3 years, with the youngest responder being 16 and the oldest responder being 71.

A total of eight patients reported an increase in seizures after the Persian Gulf war, while another four patients had seizures directly related to sounds of alarms. With these numbers, it can only be assumed there

was a rather minimal effect between stress and seizure frequency. However, patients also reported anger, anxiety, fear, and frustration as the top four influences with regard to stress and seizures.

While 18 patients stated they experienced mild stress, 82 patients disclosed that they had experienced moderate to severe stress while the war was taking place. These results demonstrate perhaps the *Stress Theory* is incorrect, as less than 25% of the exposed population in this situation was able to cope without a moderate to severe impairment, but still had a mild impairment. This study indicated weakened support for stress as a contributing factor to seizure activity.

Rather than focusing on one age group, background, or life circumstance, this review provides five studies, which when put together, represent diversity. Not only were results across adults within the same country similar; they were also consistent with results attained from children and the other side of the globe. In these studies, it was demonstrated that seizure occurrence is highly dependent on the individual. In the opinion of researchers that ran the 2012 study in the Netherlands with children, stress hormones cause seizures by having an influence on the hippocampal receptors (Braun et al., 2012). However, it is fairly undeniable that all brains are not alike; thus, an event that causes stress hormones to be released in the brain of one, may not elicit the same response in the brain of another. On that account, after examination, these five studies implicate that stress *can* act as a precipitant in epileptic patients; to what extent, and in which patients, however, may very well be conditional on processes in the individual brain.

With regard to future research in this area of Health Psychology, as technology becomes increasingly more advanced, more will likely come to be known about epilepsy. These studies have also demonstrated that seizure precipitants are not just stress, rather, a host of other factors as well. Perhaps the investigation of other psychosocial factors with regard to seizure frequency will add to the knowledge that already exists. Moreover, investigation of the individual brain and areas hypothesized to have higher activity during a seizure will also increase findings, as each person is unique in their own way.

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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Mr. and Mrs. Right:
The physical and psychological attractiveness in masculinity, femininity, and androgyny

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Abstract
Women have different ideas of the "perfect man" whereas men have a narrow idea of the "perfect woman." Masculinity (instrumentality or agency) appears to increase mental health and adjustment whereas femininity (expressiveness or communion) appears to increase social desirability. I will compare the physical features, social desirability and mental health of gendered (high masculinity or high femininity) and androgynous (high masculinity and high femininity) individuals of both sexes. This review examines psychological androgyny and argues that men are more traditional and prefer physically and psychologically feminine women whereas women like both masculine and androgynous men. Social construct theory, gender schema theory, evolutionary theory and the similarity-attractiveness hypothesis attempt to explain the influence of factors such as sex, gender, relationship type and even the phase of the menstrual cycle on sex similarities and differences in social and sexual preferences.

Keywords: *attractive, evolution, media, social, androgyny, gender*

Masculine traits such as decisiveness, dominance, confidence and assertiveness are indicative of good mental health whereas feminine traits such as warmth, compassion and kindness are linked with high social desirability (Bridges, 1981; Gangestad & Sheyd, 2005; Green, 1994; Jackson, 1983; Lefkowitz, 2006; Moore, 1987; Perrin, 1921; Pursell, 1978; Wiggins, 1978). I side with Bem's (1985) definition of "sex" as biological and "gender" as a social construct. I will alternately refer to *gendered* individuals as "traditional," or "stereotypically beautiful" that is, high in masculinity or femininity, such as John Wayne and Marilyn Monroe, *androgynous* individuals as "less gendered" or "unconventional," that is, high in masculinity and femininity, such as David Bowie, and *undifferentiated* individuals gender non-conformers who are low in masculinity and femininity, such as Teletubbies. This paper extends Cash's (1982) literature review on psychological androgyny and argues that men are more traditional and prefer physically and psychologically feminine women whereas women like both

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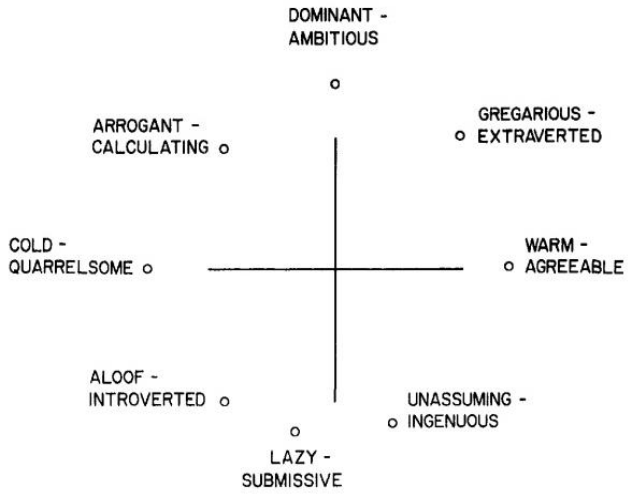
masculine and androgynous men, I will also emphasize the mental health benefits of psychological masculinity and the social benefits of psychological femininity. Antill (1983) notes that popular culture holds that a masculine man paired with a feminine woman is constantly depicted as the most beautiful and happiest of couples.

I will begin by explaining how researchers measured gender, paying special attention to the most common assessment: the Bem Sex Role Inventory (BSRI). I will explore the "surface" of attraction by analyzing initial reactions to physically gendered versus androgynous features. I will then delve skin-deep into the pros and cons of psychological masculinity, femininity and androgyny, investigating mental health and social desirability guided by gender schema theory, social construct theory, evolutionary theory and the similarity-attractiveness hypothesis (Antill, 1983; Bem, 1985; Green, 1994; Jackson, 1983; Gangestad & Sheyd, 2005).

Assessment

The BSRI, Personal Attributes Questionnaire (PAQ) and Wiggin's Interpersonal Circle are common self-report measures administered in research studies of psychological androgyny and are based on the notion that gender schemas, mental networks, shape our inferences about the gender and personality of ourselves and others (Bridges, 1981; Green, 1994; Jackson, 1987; Lefkowitz, 2006; Madson, 2000; Wiggins, 1978). The BSRI is the most widely used gender measure; it has the BSRI operationalizes masculinity as "instrumentality" and femininity as "expressiveness" It is reliable in that monthly retests produce a score of 0.90, meaning the first test's scores are highly similar to the retest scores (Bem, 1974). Psychological androgyny is *high* in both instrumentality and expressiveness while its counterpart, undifferentiated is *low* in both instrumentality and expressiveness, e.g., Spongebob Squarepants is undifferentiated (Bem, 1985). The Wiggin's (1978) Interpersonal Circle illustrated in *Figure 1* assesses gender's relationship with social traits. His comparison analysis revealed that the BSRI's instrumentality and expressiveness tend to overlap with "dominant-ambitious" and "warm-agreeable" respectively (Wiggins, 1978).

Figure 1. Wiggin's interpersonal circle.



The Personality Perception Questionnaire (PPQ) assesses gender, mental health and social attractiveness (Green, 1994; Jackson, 1987). Personality assessment expert Lefkowitz (2006) tested the reliability of self-report data by enlisting clinical psychologists to assess the subjects and found that their diagnoses were consistent with the self-reports. All in all, the assessments produce results that converge considerably, thereby increasing internal reliability, that is, the likelihood that social

and physical attractiveness is influenced by gender rather than other external factors.

Method

According to Madson (2000), physical androgyny denotes physical features that as a whole are neither male nor female, e.g., faint eyebrows, large eyes, small nose, square jaw and full lips. Most experiments (Andersen, 1981; Bridges, 1981; Green, 1994; Jackson, 1983; Madson, 2000; Moore, 1987; Pursell, 1978) brought adult subjects into the lab and asked them to evaluate the physical and social attractiveness (likeability) of a target individual based on photos, mini biographies, assessment scores, a telephone conversation or by meeting him or her in person; often both the subject and target were assessed based on gender, sex, physical attractiveness and psychological adjustment beforehand for post-test comparison to the subject's evaluation of the target. Overall, the procedures of the studies were very similar.

Gendered Beauty

Perrin (1921) studies beauty and claims that universal physical beauty is symmetrical and remarkably average, that is, a feature that looks common is much more acceptable than one that deviates, e.g., eyes of a medium size are preferred over huge or tiny eyes. He adds that there are no sex differences in this phenomenon. The Halo effect posits that physically attractive individuals are perceived to be mentally and physically healthier, sexier, more fascinating, sociable and successful than the less attractive (Andersen, 1981; Madson, 2000; Moore, 1987). Genes and mainstream society promote the polarization and attractiveness of masculine and feminine stereotypes (Antill, 1983) yet new research warns that the psychologically gendered traditional couple of masculine man with a feminine woman are outlasted by couples with two masculine individuals or two feminine individuals (Gangestad & Sheyd, 2005; Green, 1994).

While evolution may explain inherent mate preferences (i.e., males and females seeking each other to procreate), I attribute deviation to (socio-cultural conditioning) according to social construction theory's belief that genders are a human invention shaped by society (e.g., Seattle musicians of the early 90's may have grown out their hair, to evoke their rock star idols of the 70's; Bem, 1985; Gangestad & Sheyd, 2005; Green, 1994). Gangestad and Sheyd, 2005 proclaim that, across ages and cultures, males prefer physically feminine rather than physically androgynous women with Andersen's (1981) experiment on responsiveness to external beauty concurs that there is much higher consensus on stereotypical *female* beauty than stereotypical *male* beauty. Gangestad and Sheyd (2005) suggest that overall, women agree on height and muscularity yet express remarkable inconsistency in determining which male facial features, hair length or hairstyles are the sexiest. Some women pine for men with a buzz cut and chiseled features while others ogle rebellious, long hair and a sensual pout. Gangestad and Sheyd (2005) refer to evolutionary theory, suggesting that ovulation may cause a woman to seek out traditional-looking men based on supposed social prowess. They warn that a masculine face may be indicative of high testosterone and dominance but less commitment (Gangestad & Sheyd, 2005). Green (1994) concurs and reasons that androgynous-looking men may attract women whom

perceive them to be nicer, more honest and dependable in "parental pair-bonding" and investment than masculine-looking men (Gangestad & Sheyd, 2005). This connotation of commitment allows androgyny to compete with the sexual potency of tradition for access to females for procreation. Basically, all men prefer the same *feminine* physical features in a mate but women's varied preferences for *masculine* physical features may be explained by the stage of the menstrual cycle or by whether a woman is considering having a family (Gangestad & Sheyd, 2005; Green, 1994).

First Impressions

Bridge's (1981) experiment indicates that highly masculine or feminine individuals place more emphasis on gendered looks and behaviour than androgynous or undifferentiated individuals, e.g., a tall, muscular firefighter (gendered male) is more likely to date a voluptuous lingerie model (gendered female) than a large-nosed, short-haired feminist (androgynous female). Moore (1987) observed who the gendered individuals found most desirable and inferred that their gender schemas seemed to be highly reactive to the physical attractiveness of the individuals. The gendered subjects in Jackson's (1983) study also appeared to emphasize the physical appearance of target individuals of the opposite sex. Less gendered individuals display no differences in the same-sex, i.e., men with men; women with women, versus cross-sex interactions, i.e., men with women (Andersen, 1981; Bridges, 1981).

Andersen (1981) and Jackson (1983) found that gendered subjects, regardless of sex, were more engaged and interested in their conversations with physically attractive target individuals. However, unlike Andersen's (1981) findings, the male subjects in Jackson's (1983) showed a weak preference for cross-sex interaction. On the other hand, Andersen's (1981) post-tests revealed that androgynous females prefer partners who they labelled *less* "stereotypically attractive." Jackson (1983) surmised that this may reflect intimacy or social connection built on shared physical unattractiveness. In Pursell's (1978) experiment, gendered women and less gendered women preferred to socialize with androgynous target individuals rather than gendered target individuals of either sex. In contrast, gendered men and less gendered men preferred targets who adhered to gender roles, i.e., they think that women should be feminine and men should be masculine. (Pursell, 1978). Nonetheless, Bridges (1981) suggests that androgynous males' preference for physically feminine females may be minor but magnified as the average scores of males are computed by grouping together the scores of gendered males who place much stronger emphasis on physical femininity over androgyny.

In terms of first impressions, androgynous subjects preferred a target individual with androgynous looks whereas gendered subjects preferred gendered looks (Pursell, 1978). Overall, the literature reveals an overwhelming male preference for feminine physical characteristics over androgynous ones, intimating that in this case, sex trumps gender (Andersen, 1981; Bridges, 1981; Green, 1994; Moore, 1987; Gangestad & Scheyd, 2005). On the other hand, most females prefer androgynous individuals (Andersen, 1981; Jackson, 1983; Pursell, 1978).

Social Desirability

Perrin (1921) reassures that behaviour trumps looks in both physical and psychological attraction. And yet, the "beautiful" or physically gendered individuals are generally perceived to be more sociable (Andersen, 1981; Madson, 2000; Moore, 1987). Andersen (1981) observed that gendered subjects not only like gendered target individuals more, but also display more enthusiasm and interest when conversing with them. She also observed that targets perceived as more physically attractive increase their engagement in conversation, thereby boosting their social appeal. In other words, the physically gendered can increase social attractiveness (Andersen, 1981).

On the contrary, Moore (1987) reinforces the literature's findings that stereotypically "beautiful" men and women are judged to be more self-centred, less caring and less satisfied with their marriage. He discovered that less conventionally attractive subjects tend to disparage the conventionally attractive target individuals based on the assumption that beautiful people are more narcissistic; this was more prevalent among unattractive female evaluators. At the same time, Jackson (1983) argues that the beautiful are perceived to be more instrumental, but no more expressive than less attractive individuals, i.e., they appear more "competent" and mentally healthy, yet less approachable and less friendly than androgynous individuals.

Antill (1983) defines *positive psychological androgyny* as the social desirability of expressiveness combined with the mental health benefits of instrumentality: in other words it may be healthiest to be independent and confident yet warm and empathetic. Green (1994) concurs and states that positive psychological androgyny is the most attractive and conducive to long-term compatibility despite the general perception of *physical androgyny* as unattractive. Green's (1994) study reinforces Gangestad and Scheyd's (2005) evolutionary explanation in that both men and women's attraction towards androgynous target individuals was positively correlated with the length of relationship commitment. On the whole, gendered physical "beauty" connotes health and sexual potency yet less warmth and commitment than androgynous individuals (Jackson, 1983; Moore, 1987). Also recall that gendered individuals prefer to interact with gendered individuals while androgynous individuals prefer to interact with androgynous individuals. (Jackson, 1983).

Expressiveness is Attractive

Contrary to the popular belief that opposites attract, Antill's (1983) study reveals that couples with BSRI scores of FF (mutually feminine), AA (mutually androgynous) and MM (mutually masculine) report higher degrees of marital happiness than MF (gendered) and UU (undifferentiated) couples in that order. Thus, the assumption, made by some subjects in Moore's (1987) study, that gendered MF couples have lower marital satisfaction, may have been correct Thus, psychologically similar couples—especially expressive ones—are happier consistent with the similarity-attraction hypothesis, i.e., the evidence supporting "like attracts like" is stronger than that of "opposites attract"(Antill, 1983). Recall that men seem to prefer physically and psychologically feminine women (Green, 1994). Interestingly, "similarity" excludes undifferentiated individuals, being that they not only report low mental health but are

also perceived to be least attractive, physically and psychologically (Antill, 1983).

It seems that highly instrumental yet warm (androgynous) individuals are more mentally healthy and attractive than individuals low on instrumentality and warmth (undifferentiated). Psychologically masculine women may be mentally healthier, yet supporters of the feminist movement tend to be rejected by gendered individuals (Spence, et all, 1979). Brannon (2011) posits that such stigma is constructed through the media's labelling of feminists as man-haters and may be a reaction to the rewriting of patriarchal society. Moore (1987) finds that both men and women stereotype feminists as physically and socially undesirable. Bridges (1981) found the same results yet inferred a positive outcome of the women's movement: women's liberation seems to have primed many women—even gendered women—to embrace an expressive "Mr. Right." Cash (1982) noted that female subjects rated expressive males as more socially attractive than instrumental males. Still, instrumentality grew in importance when marriage and childbearing were factors. Green (1994) concludes that the preference for expressiveness in mates of both sexes may be an evolutionary adaptation to increase parental investment and bonding. Cash (1982) insists that female gendered beauty often coincides with fewer social interactions. Essentially, the tendency of traditionally beautiful women to be suspicious of men may be adaptive to filter out potentially poor fathers. He suggests that unattractive women can overcome their physical disadvantage by adapting a more approachable, socially attractive personality.

Personal Mental Health

High instrumentality may be the key to better mental health and adjustment (Spence, Helmreich, & Holahan, 1979; Cash, 1982; Jackson, 1983; Lefkowitz, 2006; Wiggins, 1978). Cook (1987) also identifies that instrumentality—e.g., high self-esteem and low neuroticism—is the strongest positive correlate of adjustment and adds that androgynous people, being high in instrumentality as well as expressiveness, also report higher self-esteem and satisfaction than feminine individuals and the undifferentiated, the latter of whom report the most negative self-concept. Green (1994) adds that highly feminine women report lower self-esteem and are more vulnerable to behavioural disorders than androgynous women. Lefkowitz (2006) would like to see positive femininity included in the criteria for mental health, e.g., warmth, kindness and agreeableness. Essentially, high masculinity scores are indicative of a healthier self-concept than androgyny, femininity and the undifferentiated (Spence et al., 1979).

Wiggin's Interpersonal Circle

Wiggins' (1978) work revealed that one's view of oneself is quite distinct amongst gendered individuals and androgynous individuals of both sexes. He found that masculine male subjects ranked high on "dominant-ambitious" and low on "warm-submissive" whereas feminine female subjects ranked low on dominance and arrogance and high on introversion and submissiveness; androgynous females' scores were the opposite of traditional females' scores. He also discovered that androgynous women reported the highest

levels of extraversion and substantially higher dominance-ambition than androgynous men. This may relate to the higher sociability of androgynous women (Cash, 1982). Wiggins (1978) noted that androgynous male subjects' scores were remarkably average in that they "clung to the means" of the overall group's scores. He concluded that overall, both gender and sex seem to shape one's interpersonal personality. Overall, masculine men and women reported the highest mental health, whereas feminine women scored lowest and androgynous men scored in between.

Gender and Sex

Many studies (Bridges, 1981; Cash, 1982; Jackson, 1983; Madson, 2000) state that gender does not influence the evaluation of a target individual's personality. I find this troubling because a considerable portion of the data from those same studies implies that gender does indeed have an effect on perception. Bridges (1981) observes that gendered evaluators tended to prefer gendered targets over androgynous ones. Likewise, Andersen (1981) noted that gendered evaluators are more attentive to conventionally good-looking targets. According to Cash's (1983) experiment results, the influence of gender on physical attractiveness evaluations was small, in favour of a more instrumental female target. Antill (1983) suggests that this preference may be indicative of MM (masculinity attracts masculinity) versus MF (masculinity attracts femininity) attraction. Androgynous target individuals in Jackson's (1983) study received the highest ratings of adjustment and likeability and were deemed more likely to succeed in the workplace than gendered subjects. However, he clarifies that the latter point is more prevalent in masculine individuals and androgynous individuals than feminine individuals. Jackson explicitly states that gender acts as a filter for social judgement. He explains that gender schemas may have been inactive in the subjects because they were provided with the target individual's gender profile before the evaluation (Jackson, 1983). Both Jackson (1983) and Bridges (1981) use "gender role" and "sex role," respectively yet fail to clearly operationalize gender. There seems to be confusion as sex and gender are often used as synonyms. Gender is not explicitly defined in any of these studies, hence the difficulty discerning the effect or lack thereof of gender on social evaluation.

Conclusion

This literature review has compared the physical features, social desirability and mental health of gendered and androgynous individuals of both sexes. I found that gender schemas shape our inferences about the gender and personality of others (Madson, 2000; Jackson, 1983). For example, the gender schemas of traditional individuals are consistently more reactive to physical attractiveness than androgynous individuals (Moore, 1987). Evolutionary theory explained that preference for physically gendered mates may be instinctual, e.g., a square jaw signifies high testosterone and dominance (Gangestad & Sheyd, 2005). Green (1994) concludes that both sexes instinctively prefer expressive partners due to higher chances of parental investment and bonding. Social learning theory reasons that non-traditional preferences may be explained by variance in environment, e.g., some women may have been socially conditioned by the women's liberation to

prefer androgynous-looking males due to seemingly higher commitment and agreeableness than "macho men" (Bem, 1985; Gangestad & Sheyd, 2005; Green, 1994). Physical androgyny's unattractiveness, compared to gendered physical attractiveness, may be more than compensated by psychological androgyny's higher social desirability and relationship commitment (Gangestad & Sheyd, 2005; Green, 1994). Lastly, Antill's (1983) study seems to support similarity- attraction (like-attracts-like) hypothesis rather than Darwin's potential-attraction (opposites attract) hypothesis because mutually feminine, androgynous or masculine, couples are happier than psychologically different couples. So far, the gendered still prefer to pair with the gendered and the androgynous still prefer to pair with the androgynous (Jackson, 1983; Moore, 1987). I was unable to find sufficient recent androgyny research, begging the question "why the decline in interest?" Perhaps more androgyny studies should be undertaken. Based on Antill's (1983) findings, I suggest that pop culture promote psychologically similar couples and expressiveness in men to increase marital satisfaction and commitment. This change may cause high testosterone (gendered) men to display more paternal behaviour to compete with the lower testosterone (androgynous) men who already imply that they are "commitment-material," thanks to stereotypes (Green, 1994). Mental health is still defined in terms of instrumentality but Lefkowitz (2006) advocates the inclusion of femininity's positive aspects such as sociability. This paper is important because positive psychological androgyny may be the key to stronger friendships, longer, happier marriages and higher mental health.

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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Who Reaps the Greatest Rewards from Charitable Giving?

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Abstract

Despite a great deal of research suggesting that prosocial behaviour can lead to increased happiness, there has been no research on who benefits most from charitable giving. This study examined whether individuals differing in baseline affect would experience differential Subjective Well-Being (SWB) benefits. Based on research suggesting that individuals with fewer personal, economic, and social resources reap the greatest rewards from prosocial behaviour, we hypothesized that individuals experiencing greater depressive symptomology would benefit the most from charitable giving. To examine this hypothesis, adults over the age of 65 were recruited to participate in a six week study. Participants attended three lab visits and received weekly phone calls in which measures of emotional affect were obtained. During weeks three, four, and five of the study, participants were instructed to spend three payments of $40, and were randomly assigned to spend this money on themselves (self-spending condition) or on someone else (prosocial spending condition). Contrary to our hypothesis, there were no significant interactions between baseline emotional affect, condition, and time, and it was noted that an individual's emotional affect at the beginning of the study did not predict changes in emotional affect at the end of the study. Thus, these results suggest that baseline affect may not play a role in determining the extent in which individuals' experience emotional benefits from prosocial spending.

Keywords: *subjective well-being (SWB), baseline emotional affect, positive affect (PA), negative affect (NA), charitable giving*

People strive to earn money with the assumption that money can alleviate life's worries. Growing up, playing the game *Monopoly* taught us that the more money one had, the more houses and materialistic luxuries one could buy and own. Therefore, money was often portrayed as the recipe to an extravagant lifestyle and profound happiness. Research suggests that even as adults we retain these often incorrect assumptions as we predict that spending money on ourselves will lead to greater

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happiness than spending money on others. However, past research suggests that money can lead to happiness if you spend it in the right way (Dunn, Gilbert, & Wilson, 2011). For example, research has documented that spending money on others, such as making donations to help feed the needy, can increase happiness (Dunn, Aknin, & Norton, 2008). If charitable giving can result in greater happiness, one question that arises is, can some individuals benefit more from charitable giving than others? To explore this question, the current study was conducted with older adults who were assigned either to spend money on themselves or to spend money on others. We wanted to determine whether individuals differing in baseline affect would benefit more from charitable giving than others.

We were interested in looking at how charitable giving interacts with baseline emotional affect to increase well-being, and to examine this question, it is important to define emotional affect and well-being. In this study, we measured Subjective Well-Being (SWB), which is commonly referred to as happiness. SWB is the "evaluation of one's life as a result of the positive and negative events that are experienced on a day-to-day basis," and higher SWB equates to greater experienced happiness (Diener, 2000). SWB can be understood as the balance between the emotions one is feeling, which can be expressed as Positive Affect (PA) or Negative Affect (NA). An increase in SWB can be due to an increase in PA, a decrease in NA, or a combination of the two factors (Charles, Reynolds, & Gatz, 2001). Studies have shown that individuals who have high life satisfaction are able to derive happiness from everyday situations (Lyubomirsky, Sheldon, & Schkade, 2005; Charles and Carstensen, 2010), and have better health and fewer social and psychological problems (Nes, Roysamb, Tambs, Harris, & Reichborn-Kjennerud, 2006).

As much as money is often portrayed as being the key to solving all of life's problems, material wealth or consumerism cannot necessarily "buy" lasting happiness since higher incomes are not correlated with higher SWB (Lyubomirsky et al., 2005; Diener, 2000). As incomes increase, living standards and desires also become more demanding, resulting in a society where individuals become programmed to strive to further themselves financially (Lyubomirsky et al., 2005). However, intentional activities, things that we choose to do ourselves, may contribute significantly to achieving lasting happiness in comparison to factors that are associated with life's circumstances, such as one's income, religion, and geographic location. Circumstantial factors have been proven to elicit only temporary happiness, while engaging in intentional activities has been correlated with an increase in long-term happiness, since we generally respond better to unfamiliar, novel events and activities that we choose to partake in ourselves (Lyubomirsky et al., 2005).

If money alone does not equate to happiness, but the act of engaging in intentional activities can lead to greater happiness, what activities can we partake in to increase our SWB? Some studies have shown that certain types of intentional activities, such as altruistic behaviours, can increase health and promote longevity (Post, 2005), and can have a positive impact on an individual's emotional state by increasing life satisfaction (Yuen, 2003). Dunn and her colleagues (2008) subsequently hypothesized that the generous spending of money may indeed lead us to be able to "buy happiness." They discovered that it is not money per se that leads to happiness, but more importantly, it is how the money is spent

(Dunn et al., 2008). Prosocial spending, money that is spent on others, such as giving donations to charities or buying gifts for friends and family, has been shown to be correlated with greater SWB (Aknin et al., 2013; Dunn et al., 2008). Studies suggest that there is a strong relationship between prosocial spending and SWB even after controlling for demographic variables, such as income, and the effect can be seen experimentally even if the participants are asked to spend as little as five dollars on others (Aknin et al., 2013; Dunn et al., 2008).

Despite a wealth of research demonstrating how prosocial spending can increase one's SWB, there has been no research investigating who experiences the greatest emotional benefits from charitable giving. Past research looking at the beneficial effects of other prosocial behaviours, such as volunteering, has shown that individuals with fewer personal, economic, and social resources may benefit the most (Morrow-Howell, 2010). Morrow-Howell and colleagues (2009) conducted a study with older adults who were less well off in terms of social, economic, and health resources. They found that participants who had lower incomes or education levels perceived the greatest benefits from volunteering and experienced the biggest increase in life satisfaction (Morrow-Howell, Hong, & Tang, 2009). Research in Dr. Dunn's Social Cognition and Emotion Lab also currently suggests that volunteering offers the greatest emotional benefits to undergraduate students who are suffering from depressive symptomatology (Whillans, Dunn, Seider, & Novick, unpublished data).

Generalizing from the research on volunteerism to charitable giving, the current study investigated whether an individual's baseline emotional affect could be used to predict the degree to which charitable giving would positively affect well-being. We hypothesized that individuals who scored higher on self-reported NA values or lower on self-reported PA values initially would experience the greatest emotional benefits in SWB from charitable giving. Similarly, we also hypothesized that individuals who scored higher on PA or low on NA initially would experience fewer gains in SWB. Although it may be commonly assumed that PA and NA are highly negatively correlated, research suggests that PA and NA do in fact vary independently (Baker, Cesa, Gatz, & Mellins, 1992). As a result, we measured PA and NA separately as we cannot assume that individuals with high PA will have low NA as well. Since individuals who are already satisfied with their lives have less potential for improvement in their emotional well-being, ceiling effects in emotional affect may also occur, thus minimizing the beneficial effect charitable giving has on these individuals.

To examine our research question of who experiences the greatest emotional benefits from charitable giving, we utilized data that was collected for another study in our lab. Although the primary aim of the original study was to investigate the effects of prosocial spending on SWB and health in older adults, the current study used many of the same variables that were analyzed in the original study. For the purpose of this paper, we looked at variables concerning fluctuations from baseline PA, NA, and SWB over the course of the study.

In an ideal situation, a representative sample of individuals from all age groups with varying levels of baseline PA and NA should be chosen. However, if the greatest emotional benefits due to charitable giving are experienced by individuals with higher baseline NA or lower baseline PA, older adults are actually well suited as participants, since

they are reaching the end of life and face numerous obstacles and challenges. Over the course of a lifetime, PA usually remains relatively stable, while NA decreases slowly as one ages, but when individuals reach older adulthood, both PA and NA begin to decrease over time, with NA decreasing at a slower rate (Charles et al., 2001). Despite experiencing slower reductions in NA than younger adults, older adults exhibit a fair amount of emotional stability when the overall trend is considered, since they also show a weaker increase in PA in response to positive events and a smaller decrease in NA with daily positive events (Röcke, Li, and Smith, 2009). As a result, any major changes in emotional affect would be significant and may be attributed to charitable giving. Older adults who gave support to others in comparison to receiving support had a reduced risk of mortality, further suggesting that the wellbeing of older adults may be particularly susceptible to modulation by charitable giving (Brown, Nesse, Vinokur, & Smith, 2003).

To summarize, we proposed that individuals with lower PA or higher NA at the beginning of the study would experience the greatest emotional benefits as a result of spending on others. Precisely, we tested our hypothesis on a sample of older adults where we predicted that individuals with lower PA or higher NA would experience the greatest gains in affect over the course of the study when assigned to spend money on others. Thus, we anticipated a three way interaction between baseline emotional affect, condition, and time. Based on the research mentioned above, less emotionally well off individuals, may reap greater rewards with response to SWB from charitable giving in comparison to their more emotionally well off peers. If the results of this study are proven to be significant, insight can be given to promote charitable giving as effective means to improve the emotional well-being of individuals in our community, especially among those who may indeed be the most emotionally distressed.

Method

Participants

One hundred and eleven older adults over the age of 65 (M = 71, SD = 4.75) participated in the current study at the University of British Columbia. Seventy percent of the participants were female; 80.2% were Caucasian, 15.3% were from varied ethnicities (2.7% East Asian, 2.7% Aboriginal, 1.8% Southeast Asian, 0.9% South Asian, 0.9% Middle Eastern, and 6.3% other), and 4.5% were mixed. Participants were recruited through advertisements posted in local newspapers and various community centres and hospitals in Vancouver, British Columbia. Prospective participants were told that they would be participating in a study investigating the effects of spending habits on health and well-being, and in return, they would receive a personalized health report based on the data obtained during the study. Individuals were pre-qualified for the study using the *Montreal Cognitive Assessment* (MoCA) to ensure that all participants had sufficient cognitive function to follow the study's complex instructions. Participants scoring lower than 26 out of 30 on the MoCA were excluded from our study, since community dwelling older adults with normal cognitive functioning score above 26 (Nasreddine et al., 2005). The Geriatric Depression Scale was also used to exclude participants with clinical levels of depressive symptomology. Thus, participants scoring higher than 11 were excluded from our study

(Yesavage et al., 1982). Since complex health problems can negatively affect emotional well-being, participants also completed a questionnaire to assess their physical health. Participants with life threatening illnesses, such as cancer or who had suffered a heart attack or a stroke in the last six months, were also excluded from our study. The first wave of the study was conducted from 2010 to 2012, and the second wave of the study is still in progress.

Procedure

Over the course of a six week period, participants were asked to attend three lab visits that took place during weeks one, four and six of the study at the University of British Columbia. Individuals were compensated $10 for travel costs each time they came to the lab. During each lab visit, participants completed verbal and written measures of emotional affect and SWB. In addition, health measures (e.g., blood pressure) and demographic information was collected. During the first lab visit, participants were randomly assigned into two spending conditions. They were given three separate payments of $40 and were instructed to spend their payments either on themselves (self-spending condition) or on others (prosocial spending condition) on a specific day during weeks three, four, and five of the study. In addition to the lab visits, weekly phone calls were conducted to obtain measures of emotional affect and SWB. Research assistants were blind to the participants' spending conditions while conducting lab visits and phone calls.

Measures

Throughout the course of this study, measures of PA and NA were taken on a weekly basis. We asked participants to verbally report their emotional affect using the 20 item Positive Affect and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) consisting of 10 positive items (α Lab 1 = 0.88, α overall = 0.88) and 10 negative items (α Lab 1 = 0.85, α overall = 0.66). On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely," participants self-reported the extent to which they identified with each statement. Positive items included moods such as "enthusiastic," "strong," and "active," and negative items included moods such as "upset," "irritable," and "nervous."

Another widely used measure of SWB is life satisfaction. Researchers use this measure because individuals often cognitively reflect on their overall conditions and life situation when assessing their emotional well-being (Diener, Emmons, Larsen, & Griffin, 1985). Using the Satisfaction with Life Scale (SWLS), participants answered five statements concerning the perceived conditions of their lives (e.g., "The conditions of my life are excellent") using a seven point scale with 1 being "Strongly Disagree" and 7 being "Strongly Agree" (Diener et al., 1985; α Lab 1 = 0.82, α overall = 0.97). Subjective happiness was also measured using the four item Subjective Happiness Scale (SHS; Lyubomirsky and Lepper, 1999). Participants who scored higher on the SHS perceived themselves as happier individuals (e.g., "In general, I consider myself: 1 – not a very happy person to 7 – a very happy person;" α Lab 1 = 0.85, α overall = 0.96). These items were averaged to create a composite score of SHS, with a higher overall score equating to greater subjective happiness.

Analytic Overview

Data were collected from the first lab visit and the five weekly phone calls, with a total of six data points with one measurement for

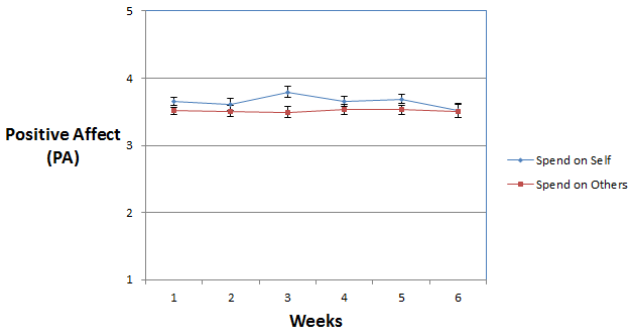
each of the six weeks. Measures of positive emotional affect included the scores from the PA subscale of the PANAS, the SWLS, and the SHS. Measures of NA included the scores from the NA subscale of the PANAS. Means of each measure were computed separately for each time point and were analyzed using a Repeated Measures ANOVA, since we were interested in looking at between condition differences across time.

For each scale (outcome variable), the condition and the self-reported measures collected at Lab 1 constituted the Between-Subjects Factors, and the data from the five weekly phone calls constituted the five Within-Subjects Factors. The particular condition a participant was in was a Between-Subjects Factor because participants were assigned to either a control condition (self-spending condition) or an experimental condition (prosocial spending condition). The Within-Subjects Factor included emotional affect, since participants self-reported their emotional affect numerous times throughout the study. Lab 1 data for each scale were chosen to be a Between-Subjects Factor and were compared against the data from the subsequent weeks, since Lab 1 data were considered to be a baseline assessment of the participants' SWB before the spending intervention occurred. A total of four separate Repeated Measures ANOVAs were run on PA, SHS, SWLS, and NA to analyze whether there was a three way interaction with differences in emotional affect across condition over the course of the study. Significance was determined for values where $p < 0.05$.

Results

To determine whether a three way interaction was present, we ran a Repeated Measures ANOVA on each of our measures. Our results suggest that there was no significant three way interaction between baseline PA, condition, and time [$F(68, 224) = 0.67$, $p = 0.97$]. Interestingly, when only analyzing condition and collapsing across time, *Figure 1* illustrates that there was actually a trend in the opposite hypothesized direction [$F(1, 56) = 3.02$, $p = 0.09$] in which participants who spent money on others had a lower overall PA average ($M = 3.52$, $SD = 0.06$) in comparison to participants who spent money on themselves ($M = 3.66$, $SD = 0.06$). However, these differences are not significant and are descriptively small considering that the scale is out of five. The figure also shows that for individuals who spent on others, PA did not decrease throughout the study and remained fairly stable.

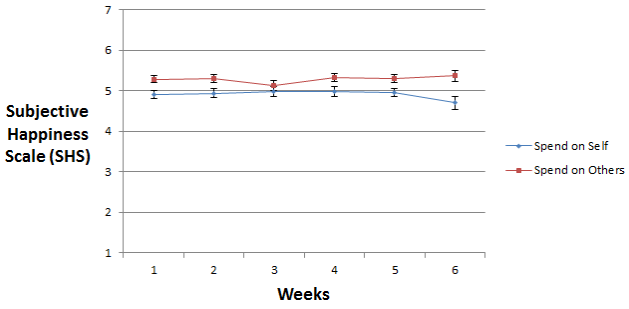
Figure 1. PA across six weeks of the study. Blue line represents PA fluctuations in participants who spent on themselves and red line represents PA fluctuations in participants who spent on others. Error bars denote standard error.



Consistent with our predictions, a significant three way interaction between baseline SHS, condition, and time was present [$F(40,288) = 1.46$, $p = 0.04$]. Thus,

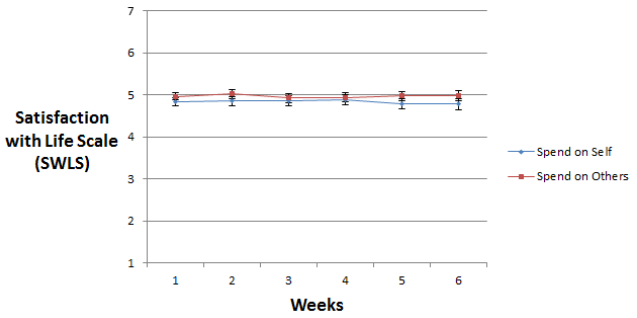
participants who spent on others, and who had lower baseline SHS ratings to begin with, experienced the largest gains in SHS at the end of the study. When analyzing the effects of condition and collapsing across time, there was a significant effect in which participants who spent money on others had a higher overall SHS average and showed an increase in SHS ratings compared to participants who spent money on themselves [$F(1,72) = 9.18$, $p = 0.003$]. *Figure 2* illustrates that participants who spent money on others were happier ($M = 5.29$, $SD = 0.08$), while people who spent on themselves were less happy ($M = 4.91$, $SD = 0.09$), with SHS scores declining over the course of the study.

Figure 2. SHS across six weeks of the study. Blue line represents SHS fluctuations in participants who spent on themselves and red line represents SHS fluctuations in participants who spent on others. Error bars denote standard error.



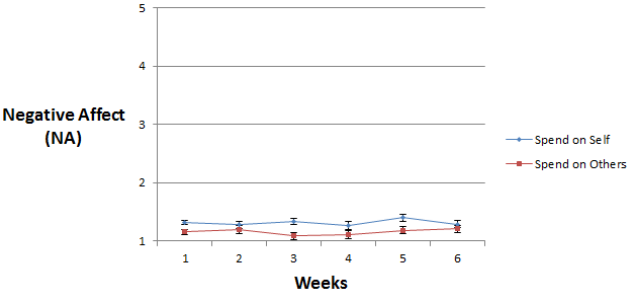
Consistent with the results of PA, there was no significant interaction between baseline SWLS values, condition, and time [$F(56,248) = 0.66$, $p = 0.97$]. However, when just analyzing the effects of condition alone and collapsing across time, the data suggests that participants who spent money on others did not have a higher overall SWLS across the six weeks compared to participants who spent money on themselves [$F(1, 62) = 1.08$, $p = 0.30$]. Despite not reaching significance, *Figure 3* suggests that individuals who spent on others had higher SWLS scores ($M = 4.97$, $SD = 0.09$) compared to individuals who spent on themselves ($M = 4.84$, $SD = 0.09$).

Figure 3. SWLS across six weeks of the study. Blue line represents SWLS fluctuations in participants who spent on themselves and red line represents SWLS fluctuations in participants who spent on others. Error bars denote standard error.



Contrary to our hypothesis that individuals with higher baseline NA would experience the greatest emotional benefits, there was no significant three way interaction between baseline NA, condition, and time [$F(28,332) = 1.06$, $p = 0.39$]. However, when collapsing across time, *Figure 4* shows that the spending condition alone could significantly predict the overall average of NA [$F(1,83) = 7.86$, $p = 0.006$] and participants who spent on themselves had higher overall NA ($M = 1.31$, $SD = 0.04$) in comparison to those who spent on others ($M = 1.16$, $SD = 0.04$).

Figure 4. NA across six weeks of the study. Blue line represents NA fluctuations in participants who spent on themselves and red line represents NA fluctuations in participants who spent on others. Error bars denote standard error.



Taken together, the only Repeated Measures ANOVA that depicted a significant three way interaction was SHS. Three out of four Repeated Measures ANOVA analyses, specifically PA, SWLS, and NA, did not show three way interactions between baseline affect, condition, and time. Thus, the majority of our results indicate that individuals' baseline levels of emotional affect does not significantly interact to predict the emotional benefits of charitable giving gained over the course of the study. However, when collapsing across time and condition, the overall average of SHS and NA could be predicted, with PA also showing a strong trend in this regard. Consistent with past research on prosocial spending, older adults who were assigned to spend money on others experienced lower NA and increased happiness on average when collapsing across the six weeks of the study.

Discussion

Due to three out of four of our measures not reaching significance, the findings of the present study suggest that, contrary to our hypothesis, one's baseline emotional affect does not predict the extent of increase in SWB as a result of charitable giving. Stated differently, an individual's emotional affect at the beginning of the study does not predict emotional affect at the end of the study, and for the most part, there was no significant interaction between baseline affect, condition, and time. However, consistent with past research on prosocial spending (Dunn et al., 2008; Aknin et al., 2013), we were able to conclude that individuals who were assigned to spend money on themselves, in comparison to individuals who were assigned to spend money on others, experienced higher NA.

We were unable to conclude that individuals who experience higher baseline NA reap the greatest rewards in SWB due to charitable giving. Therefore, a possible reason why baseline emotional affect did not predict the amount of experienced gains in SWB from charitable giving in our study may be because older adults do not experience much variability in their emotional affect and are not as susceptible to external factors that provoke emotional reactivity. Thus, our results could be explained by a recent study that was conducted by Röcke and his colleagues (2009), which showed that fluctuations of emotional affect were minimal among older adults. In this study, Röcke examined a sample of 19 older adults and investigated their fluctuations in PA and NA over a period of 45 days. This study found that emotional affect in older adults is relatively stable across time in comparison to the emotional affect of adults who are younger in age (Röcke et al., 2009). Specifically, in response to daily positive events, the older adults experienced smaller increases in PA and a lower decrease in NA thus suggesting emotional stability. Thus, the results from Röcke's study (2009) could help to explain why we were unable to detect any significant three way interactions in the current study between baseline emotional affect, condition, and time, since older adults experience high emotional stability.

Based on the findings from the previous study, however, one may question whether the documented emotional stability in older adults is simply due to the fact that the study was of a short duration, and as a result, few emotionally charged events had the opportunity to have a significant impact on emotional affect. To determine whether the duration of the study has an effect on emotional stability in older adults, Charles and colleagues (2001) ran a similar study that

assessed individuals' emotional affect over a period of 23 years. Concurrent with the findings from Röcke and colleagues' study (2009), they discovered that PA was associated with marked stability and NA decreased at a very slow rate in older adulthood (Charles et al., 2001). It may be this marked PA stability found by Charles and colleagues (2001) which could explain why there was no significant relationship with condition predicting PA, but there was a significant relationship with condition predicting NA. In another study, it was also found that NA decreased steadily up until the age of 60, with NA reaching stability in old age in years after that (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000), which could explain why spending money on others did not decrease NA for individuals low in baseline affect over time.

By old age, elderly adults have gone through numerous experiences that have evoked many different emotions, both weak and strong. Through countless trials and tribulations, older adults have developed a stronger self-image of themselves, so they may be less influenced and emotionally reactive to the situations around them (Charles & Pasupathi, 2003). Older adults may feel like "they have seen it all," and over the years have learned to recognize, regulate, and deal with their own emotions, resulting in high emotional stability (Carstensen et al., 2000).

Alternatively, there may in fact be a relationship between baseline emotional affect and SWB as a result of charitable giving, as there was a significant three way interaction shown for SHS. However, due to our small sample size, we were unable to detect significant three way interactions for three out of four of our measures. In addition, a current research study conducted by Whillans and colleagues (unpublished data) suggests that another form of prosocial behaviour, volunteering, may offer the greatest emotional benefits to undergraduate students who are suffering from depressive symptomatology (Whillans et al., unpublished data). It may be noted that the results from that study may not be applicable to the current study, since undergraduate students were used as a sample and as previously mentioned, young adults fluctuate more in their emotional affect than older adults. On the other hand, age may not be a factor because, in another study, it was determined that older adults who were less advantaged in terms of social, economic, and health resources perceived the greatest benefits from volunteering (Morrow-Howell et al., 2009).

It is worth noting that our data was only representatives of older adults. Among a sample of older adults, our results indicate that there was no significant interaction between baseline emotional affect, prosocial spending, and time. However, by having a representative sample with individuals of varying ages, a significant three way interaction between baseline emotional affect, prosocial spending, and time may indeed be present.

Thus, a similar study needs to be conducted on a more representative sample with individuals varying in age across the lifespan. It has been discovered that middle-aged adults fluctuate more in emotional affect on a given day in comparison to older adults, but fluctuate less than young adults since their self-identities are still developing (Charles & Pasupathi, 2003). Middle-aged adults have already reached maturity and have developed a strong and stable self-image of themselves, so any external stimuli may not be able to impact their durable and well established well-being. As a result, as stated above, it is important to run a study

with young adults, middle-aged adults, and older adults, so any age specific fluctuations in emotional affect can be distributed, and any significant interactions between baseline emotional affect, prosocial spending, and time can be applied to a more representative sample of individuals in our community.

Future studies on baseline emotional affect and charitable giving should be conducted. Since high emotional stability is experienced in older adults, and if we are unable to conduct the study using a representative sample, stronger emotional stimuli may be needed in order to evoke and detect any significant fluctuations in baseline emotional affect if there is indeed a significant interaction between baseline emotional affect, prosocial spending, and time. In our study, we gave participants spending payments of $40, but larger spending payments such as $100, could be used to determine whether or not a significant interaction is present between baseline emotional affect and charitable giving over time. Alternatively, participants could be asked to spend money several times during one day, as opposed to one time per week, since past research suggests that multiple acts of giving on one day leads to greater happiness in which comparison to more distributed giving (Lyubomirsky, Tkach, & Sheldon, 2004).

In conclusion, we were unable to determine a significant interaction between an individual's baseline emotional affect and the extent of gains in SWB as a result of charitable giving. Regardless of whether the participants initially scored higher in PA or NA, older adults who spent money on others all experienced gains in SWB that were of equal extent.

Declaration of Conflicting Interests

The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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Racial Bias and Stereotypes: Potential effects on the accuracy of first impressions on personality

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Abstract

Racial bias has many implications on behavioural, motivational and cognitive outcomes, all of which could have effects on how people are accurately perceived and perceive others. However, not much research has been made on how these effects would interfere with the accuracy of personality perception. This review proposes to integrate available research on the consequences of perceived and actual bias on both racial minorities and dominant groups from the fields of nonverbal communication, motivation and cognitive psychology, as well as concepts from personality psychology. Specifically, this review summarizes the processes that are likely to interfere with each of the four stages of personality perception and explores the potential consequences. Some behavioural, cognitive and motivational processes are identified as variables potentially interfering with accuracy of person perception. Additionally, being judged inaccurately in terms of personality has some potential negative outcomes for both racial minorities and dominant groups, since accurate perceptions facilitate interactions and may even leave targets inclined to greater personal and interpersonal well-being. Finally, some questions on this topic remain that deserve more systematic empirical attention.

Keywords: *person perception, accuracy, racial bias, stereotypes*

The ability to form accurate impressions of other people is certainly important in order to function well during interpersonal interactions. First impressions of broad personality characteristics are usually accurate, as individuals are able to identify stable traits and dispositions in other people across different situations (Hall et al., 2008). However, many variables can enhance or decrease the average level at which people are accurate when forming impressions of other people's personalities. This is evidenced as specific characteristics of an interaction can influence how accurately and positively participants of an interaction view each other. For instance, research has shown that the social status brought by the participants into a given social interaction

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and also their level of psychological adjustment can influence how accurately people form impressions of them and how accurately their impressions of other people are (for a review see Human, 2013). One factor identifiable in some interpersonal interactions that has the potential to influence first impression accuracy is racial bias. The expression of racism, either overtly or implicitly, is still relatively prevalent and has the potential to complicate interracial dynamics (Dovidio & Gartner, 2000; Sears, 1986). Racial minorities are still faced with group stereotypes, individual prejudice and discrimination (Major, Quinton, & McCoy, 2002), and majority group members may harbor stereotypes that lead them to mistrust out-group members (Eberhardt, Goff, Purdie, & Davies, 2004; Niemann, Jennings, Rozelle, Baxter, & Sullivan, 1994). Although there is considerable knowledge about the dynamics of racism, there is a lack of studies investigating how racial bias impacts the accuracy of first impressions of personality.

One framework that allows us to understand the accuracy of judgements of personality and that will serve as a base for this review is the Realistic Accuracy Model (Funder, 1995). According to this model, personality perception is a complex process consisting of four stages (relevance, availability, detection and utilization) and at least two individuals: one who evaluates someone else's personality (henceforth called the judge) and one whose personality is evaluated (the target). Relevance refers to behaviour that originates from someone's standing on a given trait (e.g., extraversion or conscientiousness) and that is diagnostic of that person's trait. We can expect someone who is extraverted to display open and engaging behaviours during interactions, which in turn is indicative of trait extraversion. Availability is related to how available cues are made by the target so that they can be observed by the perceiver. That means if a target is open to experience but in a particular interaction does not mention their travel plans to practise skydiving or their latest visit to an Ethiopian restaurant, they are not allowing that trait to be observable to the perceiver. Next, the judge must detect relevant and available cues emitted by the target. At last, such behavioural cues must be appropriately used by the perceiver in order to make an accurate personality judgement. That means that the perceiver not only needs to observe how agreeable the target is, but they also need to integrate that information to the profile of the target. It is important to note that the first two stages (relevance and availability) are where the target has the most influence, while the latter two stages depend mostly on the judge (Funder, 1995). It should be noted that during an interaction between two people, both participants are a target and a perceiver at the same time, but for each relevant effect discussed in this review the participant will be referred to as one or the other as is relevant to the process under consideration.

The Realistic Accuracy Model (RAM) is multiplicative in the sense that each stage can only take place if the one before it has been achieved. It follows that few cues naturally pass each stage to contribute to a comprehensive picture of the target's personality. If sufficient information about the target makes it through each stage, perceivers will achieve two kinds of accuracy. The first is distinctive accuracy, which refers to the understanding of how a given target differs from the average person and others on specific personality traits. In other words, it means understanding the target's unique, differentiating profile of traits. The second is normative accuracy, which involves

understanding how people, on average, stand on each given personality trait and how these traits vary across targets.

Relevance

The first condition for accurate personality judgement to be made is for the target to display behaviours that are relevant to who they really are (Funder, 1995). Processes that increase the likelihood of the target emitting more behavioral cues will facilitate this stage of perception.

Believing to be the target of stereotype.
When engaged in an interaction with some people we are not yet acquainted to, we usually do not have much information about them other than how they look and which ethnicity groups they may belong to. These initial pieces of information may serve as a base on which we readily perceive regarding these people's personalities and, in turn, regarding how we expect they to perceive our own personalities. Being a target of prejudice has been proposed by previous research as a factor that interferes with the relevancy of cues exhibited by individuals. It has been suggested that when targets know their interaction partners hold negative beliefs about them, they engage in interaction tactics in order to disconfirm those beliefs (Hilton & Darley, 1985; Swann, 1987). Indeed, Shelton, Richeson and Salvatore (2005) show that the more ethnic minorities expected to be the target of racial prejudice, the more they were engaged in the interactions with White participants and the more they self-disclosed. This self-disclosure, however, was not simply an increase in the communication of general information about the self, but was more likely a selection of information that would not confirm stereotypes about the individual's group. It is possible that compensatory strategies, such as increased engagement and self-disclosure, are used in attempt to reduce the threat posed by behaving in a manner that allows for a more positive, harmonious interaction (Miller & Myers, 1998). It is interesting to notice that the increased engagement from ethnic minorities led them to be seen more positively by their White interaction participants.

Positive impressions have been shown to be correlated with increased normative and distinctive accuracy (Human, Biesanz, Parisotto & Dunn, 2012). However, such expectancies also led ethnic minorities to feel less authentic during those interactions. Lowered feelings of authenticity corroborate the idea that the enhanced self-disclosure behaviours by ethnic minorities are more selective in nature, geared to disprove (or at least not confirm) stereotypes. In this sense, this enhanced self-disclosure may not be associated with the exposition of accurate information about how individual minority members actually understand their own personality. Therefore, we can expect that despite making more information available to their partners, that information is not relevant, and thus, does not contribute to a more distinctively accurate assessment of their personality.

Availability

After a target has displayed relevant cues, they must be made available to be observed by the perceiver. The amount of information and behavioral activity is a moderator for this stage of personality perception (Funder, 1995). These aspects are related to the transmission of information and the use of nonverbal behaviour, such as eye contact and hand gestures.

Self-regulation. Engaging in self-regulation is a strategy individuals with relatively high levels of racial bias may use to prevent the expression of prejudice during social interactions. Richeson and Shelton (2003) found that Whites who scored higher on automatic racial bias measures controlled their behaviour to a greater extent than participants with lower scores on racial bias. That is, participants displayed less behavioural activity, such as moving one's body less or looking around less. Thus, to the extent that an individual is exhibiting less behavioural activity, they would make fewer cues available to the perceiver.

Interaction engagement. Another aspect of interactions that real or perceived prejudice may present an impact on is the level of engagement. Indeed, White individuals who scored high on implicit measures of racial bias are seen more positively by Black interaction partners than Whites who scored low on those measures (Shelton, Richeson, Salvatore & Trawalter, 2005). This effect is related to the fact that Black interaction partners perceive high-bias Whites as more engaged than low-bias Whites. One explanation for this counter-intuitive effect is that Whites with lower levels of implicit racial bias can be less concerned with expressing prejudice, whereas high-bias Whites may have been more active during the interactions because they were attempting to regulate their behaviour so as not to appear prejudiced.

There may be a clear consequence of this heightened engagement from high-bias White individuals in how accurately their personality is perceived by members of stigmatized groups they interact with. By being more engaged in the interaction, high-bias individuals are seen more positively, and as observed previously, perceiving interaction participants more positively leads to more normative and distinctive accuracy of those impressions (Human et al., 2012). Consequently, being biased against a minority group may increase how accurately one is seen by members of the stigmatized group. However, in order to verify if this effect is true, it should be investigated whether the self-regulation high-bias White individuals experience during such interactions has any effect on how authentic they feel during those interactions. Therefore, we cannot be sure yet whether increased engagement with the purpose of not appearing prejudiced leads to being seen more accurately.

Detection

The detection stage of personality perception requires that perceivers notice and observe the relevant and available cues that the target provides (Funder, 1995). This means that it is necessary for the perceiver to attend to cues in order to detect them during the interaction.

Motivation for accuracy. There is evidence showing that motivation is an important factor when forming impressions and understanding the personality of other people. Specifically, motivation to view others accurately leads to increased levels of distinctive accuracy (Biesanz & Human, 2010). However, these accuracy motivated impressions are less normatively accurate or positive. In other words, accuracy motivated participants viewed others more in accordance with the other people's judgements of their own traits but also less positively.

For racially biased individuals, interacting with a member of a minority group is cognitively demanding (Richeson & Shelton, 2003), as indexed by lower scores at

a Stroop task. The Stroop task consists of a series of colour names that are flashed on a screen. All colour names in words appear in different colours that are either in a congruent or an incongruent colour compared against the colour conveyed by the meaning of the words themselves. The participant has to indicate the colour of each word as they appear on the screen, rather than the meaning of the word itself. Gailliot and colleagues (2007) suggested that such impaired performance in cognitive tasks stems from the depletion of limited resources by the exertion of self-control. If someone is more focused and motivated to regulate their own behaviour and to filter what they disclose, we can predict that they will not have much motivation left to make accurate impressions of someone else. It is important to note that when there is no specific motivation to be accurate, the default impression formation process tends to be rather automatic (Ambady & Gray, 2002; Hall et al., 2009) and may rely on cognitive shortcuts, such as stereotypes (Neuberg & Fiske, 1987). Indeed, Gordijn et al (2004) found that stereotype suppression requires self-control, but only for people with low motivation to be unprejudiced. Additionally, according to that same study, the act of trying to suppress a stereotype leads to an increased accessibility of the suppressed thoughts for people with low motivation to be unprejudiced.

In other words, not only are individuals expected to be motivated to control their behaviour while interacting with a non-White individual instead of getting to know them and making accurate impressions, they are also faced with the ironic effect that the more they try to suppress a stereotypical thought, the more it becomes available to them. Because of this, we should be able to predict that the more racially-biased someone is, the less likely that they will be motivated to be accurate and hence a lowered level of accuracy.

Perceiving partner as anxious. For members of dominant groups, interactions with individuals coming from minority groups may be felt as a threatening and anxiety-provoking event. Blascovich et al. (2001) found that individuals who interacted with members of stigmatized groups, such as Blacks and individuals with low socio-economic status, exhibited cardiovascular patterns associated with threat compared to those who interacted with nonstigmatized participants. Ickes (1984) shows that intergroup interactions with individuals from unprivileged groups is often a source of anxiety and distress for members of dominant groups. Littleford, Wright and Sayoc-Parial (2005) documented that White individuals report more discomfort with potential interactions with Black or Asian individuals than with potential interactions with other White individuals. This account was corroborated with measures of greater physiological reactivity (greater systolic blood pressure) from White individuals while in interracial interactions than while in same-race interactions.

The perception of such anxiety can influence the accuracy of the personality impression made of the anxious person. Perceiving someone as anxious during a small-talk setting leads to decreased feelings of closeness and positivity about the interacting partner (Kashdan & Wenzel, 2005). As cited before, normative and distinctive accuracy increase with positive impressions and decrease as the interaction participant is seen less positively (Human et al., 2013).

Diminished attentional control. Paying attention to the person someone is interacting with is an important step in the detection of relevant cues in order to understand their personality. One factor that has been shown to interfere with the ability to pay attention to a current task is the feelings of threat. As previously noted, interactions with individuals coming from minority groups may be perceived as a threatening or anxiety-provoking event by members of dominant groups, who exhibit cardiovascular patterns typically associated with threat following such interaction (Blascovich et al, 2001).

Threat to a current goal causes attentional resources to be allocated to detecting its source and deciding how to respond (Egloff & Hock, 2001; Eysenck & Byrne, 1992). Since attentional resources are focused on the threatening stimuli, anxiety impairs attentional control. According to Corbetta and Shulman (2002), there are two systems responsible for controlling attention: a goal-directed attentional system, guided by expectation, knowledge and current goals, and a stimulus-driven attentional system, influenced by salient stimuli. In line with the Attentional Theory Control (Eysenk et al., 2007), anxiety disrupts the balance between these two attentional systems, as the stimulus-driven attentional system prevails over the stimulus-driven attentional system. As a result, the ability to inhibit automatic responses is adversely affected, and resisting interference from task-irrelevant stimuli becomes more difficult. The consequence of these factors is that an individual with high automatic racial bias will tend to be more focused on the fact that they are interacting with an individual from a different race (i.e., the threatening stimulus) and less focused on how to interact naturally with another person (i.e., the current goal). Therefore, it has been hypothesized that anxiety caused by the experienced threat resulted from interacting with a member of a stigmatized group may decrease the amount of cues a participant is able to detect in order to perceive their personality.

Utilization

Once relevant and available cues are detected, the perceiver then has to appropriately utilize these cues in order to create an accurate impression of the target (Funder, 1995). Being able to generate proper interpretations of the cues provided is the main aspect of this last stage of personality perception.

The working memory. Working memory is the system that actively holds multiple pieces of information at a time in the mind, allowing for the execution of many cognitive functions, such as language comprehension, verbal reasoning, integration of information and concept formation (Hitch & Baddeley, 1976). These cognitive processes are all involved in an interaction where one communicates with other individuals and tries to understand their personality. For example, in the context of an interpersonal interaction, working memory assists processes related to understanding whatever someone is being told, with whichever accent, while integrating these pieces of information with other characteristics acquired about the interaction partner, such as ethnicity, academic affiliation or gender. It follows that working memory is of ultimate importance when interacting with other people and that interferences or disruptions to its processes could pose a negative effect on some important processes involved in cognition during such social interactions.

As previously noted, individuals from dominant groups can experience anxiety when interacting with minority group members (Blascovich et al., 2001). In turn, anxiety can interfere with the efficiency of cognitive processes. According to the Processing Efficiency Theory (Eysenck & Calvo, 1992), anxiety consumes the limited cognitive resources of working memory, therefore impairing that system's ability to process and temporarily store information. In an attempt to compensate for this, more effort and additional cognitive resources are required, which means effectiveness may not be impaired if these resources are available, but at the cost of efficiency. That is, if additional resources are available, working memory processes will not fail, but they will take up more cognitive resources. It is important to note, however, that high-bias individuals may be also engaged in self-regulation as they interact with an individual from a group they are prejudiced against. That is, they may also be preoccupied with suppressing stereotypical beliefs or, at least with monitoring how they behave or what they say (Vorauer & Kumhyr, 2001).

Thus, if only worry were at play, we would expect working memory to consume more cognitive resources, but no impairments to its performance would be noticeable. Therefore, racially biased individuals would still be expected to make reasonably accurate impressions of individuals from minority groups. However, high-bias individuals also engage in self-regulation during such interactions, which will deplete any extra available resource that would otherwise supply working memory processes. This sequence of effects has evidenced support from previous research. Stroop test performance is related to working memory capacity at a given circumstance (Long & Prat, 2002). Richeson and Shelton (2003) have found that after engaging in an interracial interaction, high-bias individuals underperformed on a Stroop task compared to low-bias individuals.

Working memory supports the integration of information in our mind through a process that is very important when utilizing information that has been detected from the interaction partner. If such cognitive function is impaired during an interaction, unique characteristics from the interaction partner may not be properly attended to in the impression formation. Thus, it is reasonable to expect that impressions of personality will not be as accurate as it otherwise possibly could.

Research supports that the activation of stereotype-congruent thoughts is automatic and that inhibiting stereotype-congruent responses and beliefs is a controlled process (Devine, 1989). In addition and as previously discussed, in the absence of a specific motivation for accuracy, the default impression formation process tends to be rather automatic (Ambady & Gray, 2002), thus often relies on stereotypes which provide cognitive shortcuts (Neuber & Fiske, 1987). In that sense, since not appearing racially biased is a prevalent norm in most social encounters, high-bias individuals will have to allocate a considerable portion of attentional resources to the suppressing of their own automatic stereotype-congruent thoughts.

Summary

This literature review has discussed some of the effects stemming from the presence of racial bias in interpersonal interactions. Previous research has shown that the level of positivity felt by the interacting partners during an interaction and how positively they view the other person would change if

individuals presume themselves to be the target of certain stereotypes (Shelton, Richeson & Salvatore, 2005). The same also holds true if they presume the other person to be prejudiced based on anxiety-related cues (Kashdan & Wenzel, 2005). In a similar capacity, motivational and cognitive effects of interacting with a person from a stigmatized group for individuals who are racially biased have been largely studied. Interacting with minority-group individuals leads to enhanced self-regulation for high-bias individuals, which causes less manifested behavioural cues during the interaction, and even temporarily impairs cognitive efficiency and the working memory (Richeson & Shelton, 2003). This temporary cognitive depletion may lead to biased impression formation. Since in the absence of specific motivation to form accurate impressions, the default impression formation process tends to be automatic (Ambady & Gray, 2002; Hall et al., 2009), usually relying on cognitive shortcuts facilitated by stereotypes (Neuberg & Friske, 1987), high-bias individuals usually do not have sufficient cognitive resources to suppress stereotypes when forming impressions of an individual from a minority group which is particularly vulnerable to prejudice.

Moreover, according to the Realistic Accuracy Model (Funder, 1995), the process of impression formation is composed of four stages: relevance, availability, detection and utilization. It is important to note that the first two stages are primarily under the influence of the target and the latter stages are mainly under the influence of the perceiver (or the judge, as defined previously in this literature review). Equally noteworthy is that each stage in this process can only take place after the one preceding it has been achieved. Therefore, even in a situation where a target makes plenty of relevant information about the self available, a perceiver's impression of that person will not be accurate if he or she does not pay attention to the target in order to detect and to utilize the cues available.

Based on these effects on both someone who might be a target of racial bias and someone who might hold negative views toward racial minorities, it is reasonable to make two predictions. The first prediction is that first impressions of a minority group member made by a racially biased person from a majority group member is likely to be lower in distinctive accuracy and normative accuracy than the impressions made by a non-racially biased member of a dominant group interacting with the same person from that particular minority group. The lower distinctive accuracy is explained by the fact that during the interaction, despite minority group members being more engaged as result of perceived racial bias, the information made available by the target is not properly detected and utilized by a prejudiced perceiver, as opposed to a non-prejudiced perceiver. The lower normative accuracy, however, would be related to the very definition of being racially biased toward an outgroup, which is to have negative attitudes about someone who is not from the person's own group (i.e., the ingroup).

The second prediction is that first impressions of a racially biased majority member made by an interacting minority member are likely to be lower in both normative and distinctive accuracies when compared with how accurate these impressions would be of someone who is also from a majority group, but who is not racially biased. The lower distinctive accuracy would be due to the self-regulation that racially biased individuals engage in when interacting with minority groups they are prejudiced against. Self-regulation leads to reduced

gesturing (Richeson & Shelton, 2003), which leads to the target making less relevant cues available to the perceiver. The lower normative accuracy can be explained by the increased anxiety experienced by the high-bias interacting participant. Perceiving someone as anxious during a small-talk setting contributes to decreased feelings of closeness and positivity associated with the interacting partner (Kashdan & Wenzel, 2005). As previously cited, normative and distinctive accuracies increase with positive impressions and decrease as the interaction participant is perceived as less positive (Human et al., 2013).

The findings discussed in this review together suggest that the presence of racial bias, either presumed or factual during an interaction, has the potential to influence the accuracy of first impressions of personality, both of someone who comes from a minority group or of an individual who is racially biased. In other words, minority group members are less judgeable by dominant group members who hold racial bias and stereotypes, who, in turn are also less judgeable by the minority members themselves. The concept of judgeability was coined by Colvin (1993) and is defined as the ability to be easily understood, to be viewed as open and knowable, as opposed to being perceived as closed or enigmatic. There are many positive consequences to being accurately understood. People who are more accurately understood tend to be more liked (Reber, Schwartz and Winkelman, 2004) and may even receive greater social support, since the open expression of one's experiences often elicits more social support from others.

As it can be seen from all these potential consequences, investigating the effects of racial bias in interpersonal interactions is another way of understanding its implications not only for minorities, but also the majority groups. Nevertheless, prospective research questions on this topic still await to be answered. For example, what are the net effects of racial bias on distinctive accuracy and normative accuracy as seen among racial minority members and dominant group members, given that many factors are at play in the increase and decrease of the amount of disclosed information about the self and the changes in people's ability to detect and utilize such information? Research in this field related to personality and impressions surely possesses its implications to every member of this modern world and clearly, there still exists wide rooms for further scientific investigations.

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The author(s) declared they have no conflicts of interests with respect to their authorship or the publication of this article.

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