Perceptions of Women Disclosing Intermittent Self-Catheterization: The Role of Empathy and Disgust

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Abstract

The behavioural immune system evolved to detect and avoid pathogens, triggering disgust and aversive cognitive and behavioural responses. Non-contagious cues resembling infection (e.g., bodily fluids) are often misperceived as pathogenic, potentially contributing to stigma experienced by individuals with disabilities. While empathy is associated with more positive attitudes, little is known about response to disability disclosure in friendship contexts. This experiment is the first to examine the role of the behavioural immune system, empathy, and disability disclosure in perceptions of intermittent self-catheterization (ISC). Participants read a vignette about a female who discloses (or does not disclose) an invisible disability (e.g., ISC) and completed measures of their affective, cognitive, and behavioural perceptions; desire for her friendship; disgust; and empathy. Behavioural immune system activation did not significantly predict perceptions of ISC alone. However, empathy was a significant predictor, and the behavioural immune system did explain additional variance in negative perceptions when empathy was statistically controlled. Contrary to the hypothesis, the woman disclosing ISC was perceived more positively and less negatively than the control woman when social desirability was controlled, with no differences in perceptions between the ISC and colostomy conditions. Group effects were strongest for cognitions. Level of disclosure (low vs. high) did not significantly influence perceptions of the woman disclosing ISC. These findings suggest disability disclosure in the context of ISC use is not associated with stigma. Further, findings suggest that strategies focused on fostering empathy and targeting cognitions may help promote more inclusive attitudes toward individuals with disabilities.

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List of Abbreviations

ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
BIS	Behavioural Immune System
DA–IAT	Disability Attitudes Implicit Associations Test
DP	Disgust Propensity
DS	Disgust Sensitivity
DV(s)	Dependent Variable(s)
GA	Germ Aversion
IAT	Implicit Associations Test
ISC	Intermittent Self-Catheterization
IV(s)	Independent Variable(s)
MANCOVA	Multivariate Analysis of Covariance
MANOVA	Multivariate Analysis of Variance
PD	Pathogen Disgust
PV	Perceived Vulnerability
PVD	Perceived Vulnerability to Diseases

Perceptions of Women Disclosing Intermittent Self-Catheterization: The Role of Empathy and Disgust

Disability affects millions across the world, with estimates suggesting that 15% of the world's population lives with some degree of disability (World Health Organization & World Bank, 2011). Disabilities manifest in highly diverse ways, with some conditions resulting in poor health and intense medical intervention, whereas other conditions are associated with less severe outcomes and may even appear to be "invisible." For example, some women living with urinary incontinence, a condition not readily identified and linked to various medical disorders (e.g., Multiple Sclerosis, spinal injuries/trauma) may require the use of urinary catheters to pass urine, which is a very private experience. Living with a disability remains a human rights issue, with disability-based discrimination and unequal treatment being a daily reality for these individuals (Mullins & Preyde, 2013; Park et al., 2003).

Gross misconceptions about the causes of disabilities and the competence of people with disabilities can create significant barriers that negatively affect their overall quality of life (Rohwerder, 2018). Beliefs that individuals with disabilities are contagious, are not able to have normal platonic or romantic relationships and are unable to contribute to society prevent individuals with disabilities from being accepted within their communities (Esmail et al., 2010; Rohwerder, 2018). Although perceptions of disability have been found to elicit pity, compassion, and the drive to be helpful, disability can trigger negative and anti-social reactions, such as avoidance (Huskin et al., 2018**;** Park et al., 2003). Little is known about the factors contributing to developing one's appraisals and perceptions of those living with a disability. Examining mechanisms that contribute to the development of one's perception of those with disabilities may help predict prejudicial responses against this population and inform interventions.

As such, this study seeks to address three broad questions. The first question involves the Behavioural Immune System (BIS), and how this system may contribute to negative perceptions of a female with an invisible disability who must use intermittent self-catheterization (ISC) to urinate. It is theorized that the BIS evolved as a psychological anti-pathogen defence system. However, since many non-contagious cues share perceptual similarity to true cues of infection and given that the risks of overlooking pathogens make it adaptive for the BIS to err towards false alarms, the result may be that these anomalous benign cues are misperceived as pathogenic. The second research question focuses on exploring the role of empathy in the formation of perceptions of a female using ISC. The third research question involves examining how degree of disability disclosure affects perceptions of a female using ISC and intentions to be her friend, but in the context of the disease-avoidance mechanism proposed by the BIS theory.

Immune System

Many of the pathogens that infect us today emerged around 11,000 years ago with the advent of large community settlements and animal agriculture (Ewald, 1994; Wolfe et al., 2007). Pathogens (e.g., viruses, bacteria, protozoa, worms, fungi) are transmitted through either direct (i.e., physical closeness) or indirect (i.e., environmental exposure) pathways (Loh et al., 2015) and produce disease that disables normal functioning. Although most disease-causing pathogens are invisible to the human eye, their effects on the human body often manifest as visible cues, such as morphological deviations from the physical norm (i.e., rashes, limb abnormalities, abnormal facial features) and non-normative behaviours (i.e., seizures, speech difficulties, poorly coordinated movements; Kurzban & Leary, 2001; Neuberg et al., 2011; Schaller, 2011). However, pathogens are rapidly evolving microorganisms and there are individual differences in response, which means that unique symptom profiles can be observed across individuals infected

with the same pathogen (Schaller & Duncan, 2007). For example, people infected with COVID-19 have reported a wide spectrum of clinical symptoms, ranging from asymptomatic presentation and mild symptoms to severe pneumonia or multisystemic failure which can result in death (Shook et al., 2020).

Pathogens represent one of the most significant and enduring threats to human health and fitness (Schaller & Murray, 2008). To circumvent the fitness costs related to pathogenic infection, humans and most animals evolved a physiological defense mechanism, known as the immune system. When a pathogen is detected within the body, the immune system is mobilized to eliminate the infectious microorganism (Shakhar, 2019). Problematically, the physiological immune system is *reactive* and limited by physical anatomy, triggered only after the pathogen has entered the body and is successfully detected (Murray, 2014; Schaller, 2016). The physiological immune system cannot identify and prevent contact with pathogens in the environment prior to them entering the body (Murray, 2014; Schaller, 2006; Schaller & Duncan, 2007; Schaller & Park, 2011). Moreover, an activated physiological immune system consumes a significant amount of energy and resources that could instead be allocated to other fitness-enhancing tasks, such as finding a mate or raising offspring (Ackerman et al., 2018; Schaller, 2011; Stevenson et al., 2011). Thus, possessing a co-regulatory pathogen defence system that mitigates the spread of infection through behavioural avoidance would compensate for the physiological immune system's shortcomings.

The Behavioural Immune System

Given the costs associated with infectious diseases and the limitations of the physiological immune system, unique fitness benefits would have been conferred by those who evolved a psychologically-based anti-pathogen defence system that inhibits contact with

infectious agents prior to them entering the body (Schaller, 2006; Schaller & Duncan, 2007). This type of adaptive behavioural modification would yield an advantage in the form of survival and reproductive success (Curtis & Biran, 2001) by preventing the development of debilitating symptoms and the costly activation of the physiological immune system. Schaller (2006) defines this proactive motivational mechanism that facilitates behavioural prophylaxis against infection as the *Behavioural Immune System* (BIS). According to this model, the BIS coordinates a suite of mechanisms that: a) detect and infer potential risks of infection in one's environment using perceptible cues; b) activate specific affective and cognitive impulses; and c) initiate disease-avoidance behaviours (Schaller, 2006, 2011). It has been suggested that the BIS evolved as a psychological first line of defence against pathogens found in the environment and conspecifics (Culpepper et al., 2018; Lieberman & Patrick, 2014; Schaller, 2011; Schaller & Park, 2011).

Behavioural defence strategies against pathogens are well documented across a wide range of species. Bullfrog tadpoles will selectively avoid swimming near water contaminated with feces and infected tadpoles (Kiesecker et al., 1999). Female mice exhibit adverse reactions toward male mice whose immune systems are activated using lipopolysaccharide, an endotoxin that activates innate immune responses (Kavaliers & Colwell, 1995). Chimpanzees actively avoid and may even exhibit aggressive behaviour towards other chimps infected with Polio (Goodall, 1986). Empirical evidence supporting the existence of the BIS in humans is summarized below.

Behavioural Immune System: Cue Detection

Any successful defence system requires the coordination of: i) detection mechanisms that recognize threatening cues; and ii) response mechanisms designed to neutralize threats by motivating adaptive behaviour (Schaller & Duncan, 2007). Moreover, an organism needs to

assess inanimate objects for pathogen threat-specific cues and evaluate the pathogenic risk introduced by conspecifics (Oaten et al., 2009; Schaller, 2011). A fundamental assumption is that the BIS employs an organism's sensory systems to detect potential sources of contamination (Oaten et al., 2009; Schaller, 2011; Schaller & Duncan, 2007). Although pathogens themselves are imperceptible to an organism's sensory systems, contagious diseases generate characteristic visible changes reliably correlated with pathogenic infection (i.e., cough, vomit, diarrhea; Nussinson et al., 2018) that human sensory systems are able to detect. BIS activation begins as an individual appraises their environment for pathogenic-risk based on various sensory cues, including: a) olfactory (e.g., the smell of urine); b) auditory (e.g., the sound of vomiting or coughing); c) tactile (e.g., touching a slimy substance); d) visual (e.g., seeing an infected wound); and e) gustatory (e.g., the taste of spoiled food; Curtis & Biran, 2001; Curtis et al., 2004; Tybur et al., 2013). Conspecifics may be appraised as being infectious because they either already appear infected (e.g., rashes, runny nose, abnormal movements) or because they behave in ways that may increase pathogen transmission (e.g., not washing hands after using the washroom, coughing in shared spaces; Schaller, 2011). Based on this sensory input, emotional and cognitive processes promoting disease avoidance behaviours may or may not be activated.

Experimental studies examining how the BIS operates in humans have primarily focused on detecting visual (i.e., gait patterns, physical features) and olfactory signals (i.e., body odour) of infection, even though there is emerging evidence suggesting that BIS disease avoidance processes engage all sensory modalities (Ackerman et al., 2020; Culpepper et al., 2018; Lieberman et al., 2018; Murray et al., 2019; Schaller, 2011; Tybur et al., 2013; Tybur et al., 2014). Given that the human visual system is highly developed and allows us to detect many different types of fitness-connoting signals from a distance, such as facial symmetry, it makes

sense that the BIS appears to be extremely sensitive to visual cues of infection (Schaller, 2011). Examples of visual pathogen cues known to elicit avoidant behaviour include the presence of urine, feces, vomit, blood, mucus, and pus (Curtis & Biran, 2001; Oaten et al., 2009); animals such as flies, maggots, or worms (Tybur et al., 2013); and morphological deviations from the expected norm (i.e., rashes; Oaten et al., 2009). Facial photographs of donors injected with lipopolysaccharide, an endotoxin that activates innate immune responses, are perceived as less healthy, less attractive, and less socially desirable than images of the same donors following saline injection (Regenbogen et al., 2017). Abnormal gait patterns and movement speeds, a type of morphological deviance, are also used as a visual cue to infer a conspecific's health (Sundelin et al., 2015). Studies have shown that targets injected with lipopolysaccharide exhibit slower walking speeds and are evaluated as being less healthy, more tired, and sadder (nonsignificant trend), than when the same targets are injected with saline (Hansson et al., 2023; Sundelin et al., 2015).

Research examining olfactory processes in disease detection suggests humans can successfully discriminate between the bodily odours of ill and healthy individuals. Olsson and colleagues (2014) compared body odour samples from individuals given a saline treatment to samples from the same individuals following treatment with lipopolysaccharide. Participants rated lipopolysaccharide body odours as smelling significantly more unpleasant, more intense, and more unhealthy than saline body odours. Further, the integration of visual and olfactory sickness cues aids in evaluating sick individuals (Regenbogen et al., 2017). Regardless of health status (sick vs. healthy), facial images paired with sick body odours showed a nonsignificant trend to be less liked than faces presented with a control odour, or healthy body odours

(Regenbogen et al., 2017). In this study the presentation of visual and olfactory sickness cues also resulted in increased neural activity in olfactory and face processing cortices.

Research suggests that human disease-avoidance processes are influenced by tactile cues analogous to the conditions in which pathogens thrive (Oum et al., 2011; Saluja & Stevenson, 2019). Sticky wet textures are strong predictors of avoidant behaviour, perceived as less appealing, and judged to be a greater disease risk than dry textures (Oum et al., 2021; Saluja & Stevenson, 2019). The breakdown of organic material by pathogens generates metabolites and other volatile compounds that serve as effective gustatory cues indicative of possible illness (Lieberman et al., 2018). For example, the sour taste of food spoiled by pathogens, such as bacteria, is a product of our taste buds detecting the presence of hydrogen ions and acids created as the food decomposes (DeSimone et al., 2001). Unfortunately, little attention has been given to auditory sickness cues, and the few available empirical investigations present mixed findings. For example, the sound of another individual vomiting was shown to elicit nausea in the listener (Sauter et al., 2010); however, it appears that individuals are unable to accurately infer pathogen threats from cough and sneeze sounds elicited by an infected target or from a healthy target (Michalak et al., 2020). Although more research on human pathogen detection is needed, the findings discussed above suggest that natural selection shaped our sensory systems to be sensitive to sensory cues consistently correlated with pathogenic risk across human history.

Behavioural Immune System: Response

Affective Response: Disgust. Disgust is the central affective component of the BIS, which is activated when individuals perceive cues that signal a risk of pathogen exposure (Curtis et al., 2004; Curtis et al., 2011; Oaten et al., 2009; Shakhar, 2019; Tybur et al., 2013). Disgust is a universal emotion (Curtis et al., 2004; Tybur & Lieberman, 2016), characterized by specific

physiological changes, such as changes in respiration (Ritz et al., 2005; Stark et al., 2005) and a distinct facial expression involving narrowed brows, a curled upper lip, wrinkled nose, and tongue protrusions (Ekman, 1973; Mesquita & Frijda, 1992).

Early theories posited that disgust evolved primarily to prevent the ingestion of contaminated foods (Rozin & Fallon, 1987; Rozin et al., 2000). However, current perspectives suggest that disgust's role is broader, encompassing avoidance of various pathogen-related risks (Curtis et al., 2004; Curtis et al., 2011; Oaten et al., 2009; Schaller, 2014) given that a key feature of disgust is its sensitivity to items that resemble pathogenic threats, even when they are not directly harmful. For example, individuals are more disgusted by stimuli resembling a bodily substance that can transmit disease (yellow liquid in a bowl; urine), than by similar disease-free stimuli (blue liquid in a bowl; Curtis et al., 2004). Tybur et al. (2009) divides disgust into three functional domains: i) pathogen disgust, which protects against pathogens; ii) sexual disgust, which deters engagement with biologically costly sexual partners and behaviours; and iii) moral disgust, related to violated social norms. Dispute their different triggers, these domains share a common function related to mitigating fitness costs introduced by pathogen transmission (Culpepper et al., 2018; Lieberman et al., 2018; Schaller, 2016). Disgust is thus the primary affective response involved in BIS disease-avoidance processes.

Disgust is aroused when the BIS perceives sensory information conveying a pathogenic risk. Many objects classified as disgusting today are those that posed the greatest risk of disease within ancestral populations. Cues found to reliably elicit disgust include: (a) bodily fluids (e.g., urine, feces, vomit, mucus); (b) spoiled foods; (c) animals (e.g., mice, cockroaches); (d) specific sexual behaviours (e.g., anal sex, fellatio); (e) poor hygiene; (f) body envelope violations and injuries (i.e., mutilation, gore); (g) decaying organic material (i.e., dead bodies); and (h) visible

signs of infection (i.e., coughing, open wound; Croy et al., 2013; Curtis & Biran, 2001; Curtis et al., 2004; Haberkamp et al., 2017; Oaten et al., 2009; Rozin & Fallon, 1987; Rozin et al., 2000; Schaller, 2016). The most cited elicitors of disgust cross-culturally are bodily fluids and wastes (Curtis & Biran, 2001), and body parts, such as the anus, genitals, and mouth (Tybur et al., 2013).

Disgust, while prompting avoidance, serves a distinct evolutionary function from fear (Aunger & Curtis; 2013; Woody & Teachman, 2000). Although both emotions motivate withdrawal from threatening stimuli (Izard, 1993), fear typically responds to social and predatory threats (i.e., animal attack, human aggression; Aunger & Curtis; 2013; Bradly et al., 2001; Neuberg et al., 2011; Woody & Teachman, 2000), whereas disgust is specialized for pathogen avoidance (Aunger & Curtis; 2013; Bradly et al., 2001; Neuberg et al., 2011; Oaten et al., 2009). Neuroimaging studies further reveal that disgust and fear activate distinct neural structures and pathways (Cisler et al., 2009, Murray & Schaller, 2016; Oaten et al., 2009). Disease-connoting stimuli have been shown to activate the insula, inferior temporal gyrus, middle occipital gyrus, and fusiform gyrus (Baumann & Mattingley, 2012; Stark et al., 2007; Tettamanti et al., 2012; Wright et al., 2004). The anterior insular cortex plays a primary role in processing disgust-inducing cues, the production of the visceral sensation of nausea, and in the conditioning of eliminative behaviours (e.g., avoidance; Anderson & Sobel, 2003; Chapman & Anderson, 2012; Phillips et al., 1998; Stark et al., 2007; von dem Hagen et al., 2009; Wicker et al., 2003; Wright et al., 2004). Comparatively, processing of fearful stimuli (i.e., predatory attack, physical aggression) was uniquely associated with increased activation of the middle temporal gyrus, middle and superior frontal gyri, posterior cingulate cortex, and precuneus (Stark et al., 2007; Tettamanti et al., 2012; Wright et al., 2004). The activation of unique facial muscles in response

to disgusting versus fearful stimuli also supports the existence of a psychological mechanism exclusive to pathogen avoidance (Bradley et al., 2001; Vrana, 1993, 1994; Vartanian et al., 2018; Yartz & Hawk, 2002).

Regardless of the universality of disgust, disgust varies across individuals in terms of intensity and frequency of occurrence, as measured by two distinguishable factors: (a) *disgust propensity* (DP); and (b) *disgust sensitivity* (DS; Overveld et al., 2006). DP refers to how readily individuals experience and respond with disgust, and DS describes the degree of distress felt when disgusted (Fergus & Valentiner, 2009; van Overveld et al., 2006). Even though DS and DP are highly correlated (r = .59; Fergus & Valentiner, 2009) they have distinct effects. Higher DP is linked with more frequent avoidance of pathogen-related stimuli (Fergus & Valentiner, 2009; Goetz et al., 2013), whereas higher DS predicts greater anxiety about one's health (Brady et al., 2014) and more intense reactions to disgust-eliciting cues (Fergus & Valentiner, 2009; Goetz et al., 2013). For example, people with higher DS and DP show greater distress around becoming infected with COVID-19 (McKay et al., 2020; Paluszek et al., 2021). Research also demonstrates that individuals higher in DS show heightened visual avoidance of disgusting images (e.g., video of someone vomiting) than images depicting a different threat (e.g., video of an individual harmed in a motor vehicle accident; Armstrong et al., 2014; Olatunji et al., 2008).

Another prominent indicator of BIS activation related to disgust is *perceived vulnerability to disease* (PVD; Duncan et al., 2009). PVD is an individual differences variable consisting of two dimensions: (a) perceived vulnerability (PV); and (b) germ aversion (GA; Duncan et al., 2009). PV refers to subjective beliefs about one's susceptibility to illness, and GA reflects discomfort in situations with a high risk of disease transmission (Duncan et al., 2009). PVD and DS/DP are related but distinct constructs (Duncan et al., 2009). PVD is related to how

much individuals see themselves as vulnerable to certain diseases, and the emotional distress resulting from this risk assessment (Duncan et al., 2009). Comparatively, DS and DP are related to the emotional reactions to a broad range of stimuli that trigger feelings of disgust (Church et al., 2022; Duncan et al., 2009).

Aversive responses to pathogen-related stimuli are exaggerated in individuals who perceive themselves to be more vulnerable to infection, particularly when the threat is made salient. Those who feel more susceptible to disease show a stronger preference for healthy, symmetrical faces and rate them as more attractive (Welling et al., 2007; Young et al., 2011). During the COVID-19 pandemic, high levels of GA and PV predicted increased preventative behaviours (i.e., wearing a mask, avoiding social contact; Hromatko et al., 2021; Stangier et al., 2021). In general, people with high PVD are more concerned about their health (Taylor et al., 2020a).

Experiencing disgust decreases the probability of coming into contact with contaminated stimuli, especially when cues originate from unfamiliar sources (Miller & Maner, 2012; Schaller & Park, 2011). In ancestral times, strangers posed health risks due to unfamiliar pathogens that group members were not yet exposed/immune to (Faulkner et al., 2004; Mortensen et al., 2010; Navarrete et al., 2007; Navarrete & Fessler, 2006), and more recently, research has shown that strangers evoke more disgust than familiar people (Lenk et al., 2019). Mothers are less disgusted by the smell of their own baby's used diaper compared to a stranger's baby (Case et al., 2006). The bodily fluids and wastes (i.e., urine, body odour) of friends, as compared to strangers, elicit less disgust and aversive behaviours (Curtis et al., 2004; Peng et al., 2013; Rozin et al., 1989; Stevenson & Repacholi, 2005). Additionally, individuals high in PVD rate themselves as less agreeable and open to new experiences while showing quicker avoidant arm movements (i.e.,

pushing images away) in response to images of unfamiliar neutral faces (Mortensen et al., 2010). PVD is also linked to xenophobia, and anti-immigrant and ethnocentric attitudes (Faulkner et al., 2004; Mortensen et al., 2010; Navarrete & Fessler, 2006). These findings demonstrate how disgust was shaped by evolutionary pressures.

The studies reviewed support the hypothesis that disgust serves a disease avoidance function. Disgust, as part of the BIS, is triggered by pathogenic cues and can be activated temporarily or chronically in individuals who feel more vulnerable to infection. This aversive response motivates pathogen avoidance, and individual differences in disgust (e.g., PVD, DS/DP) influence the extent of these avoidance behaviours.

Cognitive Response: Aversive Cognitions, Overgeneralization & Functional Flexibility. Researchers studying pathogen avoidance describe the BIS as a functional mental module comprised of cognitive mechanisms with restricted inputs and specialized functions (Barrett & Kurzban, 2006; Schaller, 2016; Sperber, 1994; Sperber & Hirschfeld, 2004). In the context of pathogen avoidance, the BIS is designed to process input reflecting "true" indicators of infection (e.g., feces, bodily fluids, lesions). However, research has shown that anomalous, non-infectious cues (e.g., physical disabilities, obesity, birthmarks, old age) can activate disease-avoidant cognitions and behaviours meant to reduce the risk of infection (Ackerman et al., 2009; Kurzban & Leary, 2001; Lieberman et al., 2012; Miller & Maner, 2012; Park et al., 2003; Ryan et al., 2012; Schaller & Neuberg, 2012). For example, Ryan et al. (2012) demonstrated that participants expressed equal levels of disgust toward objects handled by individuals with non-infectious facial birthmarks ("false" disease cue) and those infected with influenza ("true" disease cue). Although participants acknowledged that influenza posed a higher infection risk

than birthmarks, they exhibited similar avoidance behaviours, suggesting that the BIS perceives anomalous cues, such as birthmarks, as genuine indicators of pathogen risk.

The BIS may perceive the presence of pathogens in non-infectious stimuli because there is no finite set of cues indicative of the presence of pathogens. Humans infer the presence of pathogens through superficial sensory cues traditionally correlated with infection (e.g., rashes, bodily fluids, morphological deviances), which constitute the "proper" domain of cues the BIS was designed to respond to (Schaller, 2016; Sperber & Hirschfeld, 2004). However, pathogens evolve rapidly, with different organisms causing distinct symptoms, and even individuals infected by the same pathogen can exhibit varying symptoms. If the BIS were overly calibrated to specific cues, it may overlook slightly different yet diagnostic indicators of infection. It would have been much more adaptive for the human BIS to be sensitive to cues *broadly correlated* with pathogen presence (Neuberg et al., 2011; Sawada et al., 2018; Schaller & Duncan, 2007).

The most commonly shared visual symptom of pathogen infection is morphological deviance, or the figurative and visual dissimilarity to the "healthy" prototype stored in memory (Nussinson et al., 2018). Since pathogens and their symptoms vary, a simpler and thus more adaptive approach would be to learn the physical and behavioural characteristics of healthy prototypes, rather than learning specific cues indicating the pathogen presence that can be exploited by many pathogens (Ackerman et al., 2018). It is safer and easier to interpret any deviation from the healthy norm as being a sign of infection (Ackerman et al., 2018; Kurzban & Leary, 2001; Nussinson et al., 2018). Cue detection is further complicated by the existence of many non-pathogenic cues that resemble true indicators of infection. For example, physical disfigurements or behavioural disabilities caused by accidents or genetics are not contagious. Therefore, the "actual" domain of cues the BIS responds to comprises both the true pathogen

cues it was meant to detect (proper domain), and the similar, non-pathogenic cues that it processes unintentionally as a by-product of its design (Schaller, 2016; Sperber & Hirschfeld, 2004). This hypothesis is supported by studies demonstrating that individuals respond with disgust to a piece of chocolate fudge sculpted into the shape of feces (Rozin et al., 1986), and that targets with non-contagious facial blemishes (e.g., acne) are rated as less healthy than targets without facial blemishes (van Leeuwen & Jaeger, 2022). These findings suggest that disgust reactions may arise in situations that do not pose a pathogenic threat.

The tendency of the BIS to respond to a wide array of cues – both accurate (proper domain) and inaccurate (actual domain) – creates a classic signal detection problem where errors inferring pathogenic risk become highly likely (Sawada et al., 2018; Schaller & Duncan, 2007). The adaptive principles of *error management theory* (Haselton & Buss, 2000; Haselton et al., 2015) dictate that the solution to this problem involves minimizing the error that poses the greatest risk to an individual's fitness, even if that results in an increased rate of false alarms. Since the costs of overlooking a genuine pathogen are far more severe than the costs of avoiding someone who poses no actual infection risk (Fleischman et al., 2015; Oaten et al., 2009; Tybur et al., 2020), it is more adaptive for the BIS to make false-positive errors (e.g., mistakenly perceiving a healthy individual as infected) than false-negative errors (e.g., assuming a sick individual is healthy). As a result, evolution would have favoured the development of a cognitive bias that over-perceives pathogenic threats to prevent costly false-negative errors, yielding oversensitive and overgeneralized BIS responses (Haselton & Buss, 2000; Haselton et al., 2015; Sawada et al., 2018; Schaller, 2016; Schaller & Duncan, 2007).

Just as there are costs and benefits associated with immune responses, similar trade-offs exist for BIS-related behaviours. Avoiding social contact may reduce pathogen exposure but

significantly limits opportunities for social exchange, mating, and supporting kin (Case et al., 2006; Fleischman et al., 2015; Tybur et al., 2020). In contrast, lower sensitivity to pathogen-related cues can eliminate the social costs of avoidance, but this approach leaves individuals incredibly vulnerable to infection (Tybur et al., 2020). BIS activation also consumes metabolic resources, of which there is a finite amount available to the individual at any moment, thus limiting the degree to which other adaptive behaviours are expressed (e.g., mating; Schaller, 2011; Schaller & Park, 2011).

The BIS overcomes this cost-benefit problem by exhibiting functional flexibility (Schaller, 2016; Schaller & Duncan, 2007; Schaller & Park, 2011). The strength of one's BIS response to perceived pathogenic stimuli varies depending on personal factors (i.e., PVD, DS, DP) and cues present in conspecifics and the environment indicating that the functional benefits of a BIS response outweigh potential costs under those conditions (Neuberg et al., 2011; Tybur & Lieberman, 2016). The interplay of adaptive overgeneralization and functional flexibility helps explain why anomalous, yet benign cues, can sometimes be heuristically associated with pathogenic infection, generating many false alarms in pathogen detection.

Research supports the above rational by demonstrating that increased sensitivity to morphologically deviant stimuli can decrease the likelihood of false-negative errors, while simultaneously increasing the risk of false-positive errors. Priming individuals with a pathogen threat enhances their ability to differentiate between perfect and abnormal geometric shapes, indicating a greater sensitivity to morphological deviation, even among stimuli not related to pathogen transmission (Nussinson et al., 2018). Moreover, humans commonly use facial and body symmetry as cues to infer heritable fitness benefits because it is strongly associated with immune strength and genotypic quality (see Møller & Thornhill, 1998 for review; Thornhill &

Gangestad, 1999). Feeling vulnerable to disease (either as a chronic trait, or temporarily as the result of an experimental manipulation) was shown to predict an increased preference for symmetrical faces (Little et al., 2011; Young et al., 2011).

While this approach is evolutionarily adaptive because it limits potential exposure to pathogens, it becomes problematic in the context of social perceptions and social behaviour, as it may lead to the stigmatization and avoidance of individuals with even minor deviations from the healthy norm, potentially perpetuating biases and negatively affecting social interactions. Research has shown that obesity is appraised as morphologically deviant and operates as a heuristic cue for pathogen infection (Lieberman et al., 2012; Miller & Maner, 2012; Park et al., 2007; Vartanian et al., 2016). Increased DS towards pathogenic objects (e.g., feces, bloody cuts; Lieberman et al., 2012) and chronic concerns about pathogen transmission (PVD; Park et al., 2007) predicted stronger negative attitudes towards obese individuals, independent of other prejudice factors (e.g., attributions about lack of willpower to lose weight; Park et al., 2007). Images of an overweight female are rated as more disgusting than images of the same female after weight loss (Vartanian et al., 2016). Similarly, old age has also been identified as a heuristic disease cue, with increased ageism present in individuals high in PVD, especially when pathogen transmission threats are experimentally induced (Duncan & Schaller, 2009; Miller & Maner, 2012).

The overgeneralization of the BIS is further demonstrated by research on attentional biases related to pathogen avoidance, which indicates that people focus more on physical abnormalities than on normal features (Ackerman et al., 2009; Miller & Maner, 2011). For instance, participants spend more time looking at faces with crossed eyes or birthmarks compared to those faces without these features, and this bias was particularly pronounced in

individuals primed to be sensitive to pathogenic threats (Ackerman et al., 2009) and those who had been ill recently (Miller & Maner, 2011). These findings support the hypothesis that people misperceive infection risk in benign features, and that heightened sensitivity to potential pathogens leads to increase scrutiny of atypical traits that pose no real threat.

The degree to which true pathogenic cues and perceptually similar false cues activate the BIS has significant implications for social cognition, namely affiliation and interpersonal value. Individuals report decreased interest in social interaction when the BIS is experimentally activated using pathogenic primes (e.g., images of skin rashes, lesions, pustules; McCarthy & Skowronski, 2014; Sacco et al., 2014). Individuals high in PVD show less romantic interest in and attraction to unfamiliar others, even highly attractive strangers, and these individuals are also perceived as being less affiliative during face-to-face interpersonal interactions (Sawada et al., 2018).

Interpersonal value, shaped by kindship, validation, and reciprocity, affects how we evaluate pathogenic risks. Kin (i.e., parent, sibling, child) and non-kin (i.e., friend, stranger) hold different interpersonal values that can inform perceived risk levels of interacting with an individual when encountering a heuristic disease cue, as per the source effect (Cao et al., 2022). Research shows that images of unfamiliar older individuals paired with disgusting statements evoke more disgust (experiment 1) and avoidant behaviour (experiment 2) than pairing the same sentences with familiar older adults (Cao et al., 2022). People also feel more comfortable with pathogen exposure when engaging with targets from more highly values categories, such as a close friend or romantic partners, than targets with less interpersonal value, such as disliked others (Cao et al., 2022). These findings, consistent with earlier studies showing that strangers evoke more disgust than familiar individuals (Curtis et al., 2004; Lenk et al., 2019; Peng et al.,

2013; Rozin et al., 1989; Stevenson & Repacholi, 2005), suggests that interpersonal value alters BIS responses leading to relaxed protective behaviours toward valued individuals, while those with less interpersonal value are appraised as threats to one's health.

As with most evolved mechanisms, researchers suggest that BIS activation is automatic and operates outside of one's awareness without much conscious or rational deliberation (Duncan, 2005; Schaller & Park, 2011), providing further rationale as to how benign noncontagious cues become misperceived as pathogenic. Studies using the Implicit Association Test (IAT; Greenwald et al., 1998) show that individuals more easily associate obesity (Park et al., 2007) and old age (Duncan & Schaller, 2009) with disease-relevant concepts (e.g., contagion, disease), as compared to disease-irrelevant concepts. These effects are enhanced when participants feel more vulnerable to infection (Park et al., 2007) and among those dispositionally inclined to perceive themselves as more vulnerable to pathogens (Duncan & Schaller, 2009).

Notable evidence for the automaticity of aversive disease-relevant cognitions, especially in response to noncontagious but perceptually similar cues, comes from Duncan (2005). In this study, participants viewed images of two men with conflicting health biographies: (a) one man with a non-infectious facial birth mark (heuristic cue) described as healthy; and (b) one man with no visible blemishes but described as having tuberculosis. Of the two men, the concept of "disease" was more strongly implicitly associated with the healthy man with the facial birthmark than the diseased man who looked healthy. These findings indicate that when presented with contradictory health information, visual cues serve as heuristics that automatically activate aversive cognitions, significantly influencing initial perceptions of health status over objective and rational health knowledge. Further evidence comes from Curtis and Biran (2001), who found that most participants struggled to explain why they perceived certain objects and events as

disgusting but instinctively labelled the disease-relevant stimuli were “yuk”, highlighting the impulsive nature of BIS cognitions.

An additional cognitive heuristic likely contributing to the appraisal of disease-relevant stimuli is the affect-as-information model (Schwarz & Clore, 1988, 2003). Manipulating trait- and state-level disgust using various known disgust elicitors and/or environmental cues is the most common technique used to study the cognitive outcomes of BIS activation. The affect-as-information model can be used to understand the function of disgust in activating specific aversive cognitions into working memory. This model suggests that affective states are used as a source of information when making judgements about someone or something (Clore & Huntsinger, 2007; Forgas, 2002; Schwarz & Clore, 1988, 2003). In the context of the BIS, the negative state aroused by disgust is one of many strands of information weighed when determining the trade-offs between pathogen avoidance and other fitness-relevant goals (Isbell et al., 2013; Neuberg et al., 2011; Tybur & Lieberman, 2016; Tybur et al., 2020).

The evidence presented suggests that humans depend on a wide range of superficial heuristic cues to assess others’ health status. Along with the affective experience of disgust, cognitive biases influence behaviour toward disease-related stimuli, situations, and individuals perceived as being a pathogenic risk. Many non-contagious cues share perceptual features with true cues of infection, generating misfires in pathogen avoidance. Due to the fitness costs of ignoring potential infections, the BIS operates on the principle of adaptive overgeneralization, erring on the side of caution by respond to a broad range of anomalous and benign cues that might signal infection. Moreover, reactions to heuristic pathogenic cues are largely automatic, impacting cognitive processes that shape our perceptions of others. The many forms of discrimination faced by marginalized groups may then reflect the BIS’s adaptive response,

identifying false positives to maximize hit rates, as described by error management theory. Although the functionality of the BIS is evolutionarily adaptive and protects against genuine pathogens, it raises concerns from sociopolitical, humanistic, and feminist perspectives due to its potential negative implications, particularly by fostering avoidance of individuals with non-infectious abnormalities.

Behavioural Response: Avoidance. Despite individual differences in disgust (e.g., PVD, DS, DP) and contextual factors found in the environment, researchers agree that the adaptive solution generated by the BIS is behavioural avoidance (see Murray & Schaller, 2016; Neuberg et al., 2011; Oaten et al., 2009; Schaller, 2016; Schaller & Duncan, 2007; Tybur & Lieberman, 2016). Hygiene is one of the most obvious forms of pathogen-avoidance behaviours (see Curtis, 2007; Curtis et al., 2011), encompassing practices such as self-grooming (e.g., handwashing, regular bathing), food preparation rules, avoiding infected conspecifics (i.e., social distancing), safe sexual practices, and environmental cleanliness (i.e., removal of substances or species that can house and transmit pathogens; Curtis, 2007; Hart, 1990). Historical findings, such as ancient drainage systems, toilets, and grooming tools (i.e., ivory comb), suggest that cleanliness was important to early humans (Curtis, 2007). Across ancient and modern societies, the act of washing holds symbolic value by equating untouchable substances or individuals with impurity to reinforce hygiene as a public good (Curtis et al., 2011).

Societies with strong anti-pathogen norms would have outperformed other groups lacking such practices. Cultural variation in hygiene behaviours likely reflects regional differences in exposure to severe pathogen pressures (Curtis, 2007; Curtis et al., 2011; Oaten et al., 2009; Schaller, 2006, 2011; Schaller & Murray, 2008). For example, societies in pathogen-dense environments cook with more culinary spices, which act as natural antibiotics (Billing &

Sherman, 1998). Individuals seen as failing to adhere to culturally prescribed hygiene rules face social punishments and are avoided or excluded (Faulkner et al., 2004; Schaller & Murray, 2008). This aversion extends to outgroup members who are perceived as health risks due to their unfamiliar hygiene practices (Curtis et al., 2011; Schaller, 2006). Societies with a history of significant pathogen exposure tend to be more collectivist (Fincher et al., 2008) and have inward personality styles (e.g., low in extraversion; Schaller & Murray, 2008), possibly to minimize pathogen spread. Cultural learning may help explain individual differences in aversive responses to pathogens (Oaten et al., 2009; Schaller, 2006; Shook et al., 2018), though factors such as geopolitical climate and technology likely also shape hygiene practices.

Hygiene behaviours remain essential for both personal and community protection from infection. Physical distance is a key avoidance behaviour, with individuals often distancing themselves from those perceived as ill (i.e., cancer, bronchitis, herpes), especially is the illness appears to be highly contagious (Crandall & Moriarty, 1995). Children avoid physical contact with, and being near, individuals described as sick, particularly if they have knowledge of illness transmission and contagion (Blacker & LoBue, 2016). Individuals with higher DS prefer greater personal space (Park, 2015), whereas individuals higher in GA maintain greater physical distance even in non-risky virtual settings, reflecting the BIS cognitive bias for overestimating disease risk (Pazhoohi & Kingstone, 2022). Crowded spaces are evaluated negatively and perceived to be more highly crowded by people high in PVD for which the threat of infection is made temporarily salient (Wang & Ackerman, 2019). Thus, disgust, paired with aversive cognitions about disease, helps calibrate the intensity of behavioural avoidance toward potential pathogenic situations and cues.

The COVID-19 pandemic provided researchers with a unique naturalistic setting to observe how personal factors (e.g., PVD) and environmental pathogen stress shape avoidance behaviours. Studies have demonstrated that both components of PVD, GA and PV, independently predicted greater adherence to COVID-19 social distancing mandates, and those high in PV specifically showed a stronger preference for social distancing and personal space (Makhanova & Shepherd, 2020). Similarly, Shook et al. (2020) found a significant positive association between BIS indicators, GA and DS, and concerns about COVID-19 and adherence to preventative practices (i.e., handwashing, disinfecting/cleaning). Further research during the pandemic noted preference for greater distance from outgroup members was common among those high in DS and GA (Meleady et al., 2021; Szymkow et al., 2021), and among those with higher subjective estimates of situational pathogen presence (Meleady et al., 2021). Individuals with heightened DS also maintained more social distance from targets wearing and not wearing a mask (Olivera-La Rosa et al., 2020). Generally, individuals with elevated disease concerns were more prone to experiencing disgust, had greater fears of contracting COVID-19, and preferred maintaining greater physical distance from others (Hromatko et al., 2021; Lisi et al., 2021; Welsch et al., 2021).

A longitudinal study by Ammann and Berthold (2023) tracked pathogen DS levels before the pandemic (i.e., 2018), during the height of the pandemic (i.e., 2020), and later in the pandemic (i.e., 2022) to examine the effects of changes in pathogen DS on the perception of two crowded spaces (i.e., concert, city bus). Data collected from 11 countries (study 1) across the three time points (experiments 1–3) revealed that pathogen DS was a significant predictor of disgust toward crowded spaces. Changes in DS were also observed, such that pathogen DS increased during the pandemic (time point two; experiment 2), whereas levels of pathogen DS

before the pandemic (time point one; experiment 1) were similar to levels observed later in the pandemic (time point three; experiment 3). The researchers argue that increased awareness and recommendations for distancing and hygiene sensitized people to be more aware of the presence of pathogens in their environment, resulting in fluctuations in DS throughout the pandemic, while also demonstrating the BIS's adaptability in the face of current pathogen pressures. These findings are complemented by studies demonstrating that levels of DS, GA, and PV have risen significantly from pre-pandemic levels (Miłkowska et al., 2021; Stevenson et al., 2021). The combined evidence from these studies indicate that BIS activation adjusts based on pathogen prevalence and that context plays a crucial role in the BIS's influence on behavioural avoidance.

Consistent with the hypothesis that the BIS responds to a variety of cues probabilistically indicative of pathogens, data from several sources has shown that individuals avoid those with features heuristically associated with pathogens, even when non-contagious. Participants rate the images of individuals with non-infectious conditions, such as acne, as being less healthy and express more discomfort in having physical contact with them (van Leeuwen & Jaeger, 2022). This relationship was moderated by participant DS; participants high in DS were more influenced by their perceptions of health and the facial acne when deciding to approach or avoid an individual (van Leeuwen & Jaeger, 2022). Similarily, individuals with an activated immune system due to recent illness display heightened behavioural avoidance of people possessing heuristic disease indicators, such as birthmarks or crossed eyes (Miller & Maner, 2011). The association between disgust and avoidance extends to symbolic cues, such that restaurant inspection reports paired with a disgust emoji triggered more avoidance responses than reports paired with a neutral or happy emoji (Ray & Merle, 2021). A final example of behavioural avoidance in response to anomalous cues comes from the large number of published studies

detailing avoidant behaviour towards outgroup members (i.e., Faulkner et al., 2004; Ji et al., 2019; Makhanova et al., 2015; Miller & Maner, 2012; Mortensen et al., 2010; Navarrete et al., 2007; Oaten et al., 2011; Schaller & Murray, 2016; Schaller & Neuberg, 2012).

The findings presented in this section have significant implications for understanding various social psychological phenomena, especially the psychology of stigma and prejudice toward groups bearing anomalous, yet benign, characteristics (Oaten et al., 2011; Schaller & Murray, 2016; Schaller & Neuberg, 2012). The literature is replete with evidence (Ackerman et al., 2018; Murray & Schaller, 2016; Schaller, 2016; Schaller et al., 2022) suggesting that BIS activation contributes to ethnocentrism (Faulkner et al., 2004; Navarrete & Fessler, 2006; Narvarrete et al., 2007), xenophobia (Esses & Hamilton, 2021; Faulkner et al., 2004; Ji et al., 2019; Yamagata et al., 2020), political conservativism (Inbar et al., 2009; Shook et al., 2017; Tybur et al., 2010), social conservativism (Henderson & Schnall, 2021; Olatunji et al., 2008; Terrizzi et al., 2010; Terrizzi et al., 2013), anti-fat attitudes (Lieberman et al., 2012; Miller & Maner, 2012; Park et al., 2007), ageism (Duncan & Schaller, 2009; Miller & Maner, 2012) and judgements of physical attractiveness (Regenbogen et al., 2017; Sawada et al., 2018; Welling et al., 2007; Young et al., 2011). The current study aims to extend BIS research by exploring the influence of the BIS on perceptions of individuals with disabilities, specifically invisible disabilities, an area that has received little empirical attention.

Disability

Disability is a universal human experience affecting people of all ages, genders, and backgrounds (Goodley, 2011). Disability is a broad term applied to a diverse range of conditions that limit participation in daily life and range in severity. The United Nations defines disability as arising from the interaction between people with impairments and societal barriers (e.g.,

attitudinal, environmental) that restrict equal participation in society (United Nations, 2006). Disabilities vary widely, as do their causes, with some present at birth (e.g., congenital defects) and other developing over time or due to accidents (Ontario Human Rights Commission, 2016). They are commonly grouped into four broad categories – intellectual, developmental, physical, and psychological – each causing various cognitive, affective, behavioural, and/or motor impairments (Kirshbaum & Olkin, 2002; Milligan & Neufeldt, 2001). Some disabilities have visible markers, like unusual physical traits (e.g., Down's Syndrome) and/or behavioural deviations (e.g., Tourette Syndrome), while others, such as depression, are "invisible" with no overtly noticeable manifestations (Kurzban & Leary, 2001; Mullins & Preyde, 2013). An estimated 1.3 billion people globally experience significant disabilities (WHO, 2023). In Canada, 6.2 million people aged 15 and older (22% of the population) have a disability, with 71% living with multiple disabling conditions (Statistics Canada, 2018, 2022). Despite being one of the largest minority groups, people with disabilities remain highly marginalized (Wiener & Willborn, 2010).

The avoidance and exclusion of disability is well documented throughout history. Historically, disability was often equated with disease, with those affected perceived as being unclean and tainted, justifying their systematic isolation as a means of "purification" (Covey, 1998). In the 19th and 20th centuries, many countries institutionalized and/or involuntarily sterilized people with disabilities, believing they lacked the capacity for human emotions (Greenberg et al., 2015) and possessed "compromised" genetics unfit for the reproduction of future generations (Grenon & Merrick, 2014). North America favoured sterilization over institutionalization since sterilized individuals could reintegrate into society, which reduced economic costs associated with maintaining institutions and prevented the transmission of

undesirable traits (Kevles, 2004). Hitler's enactment of the *Aktion T4* euthanasia program further highlights the extreme marginalization of people with disabilities, leading to the deaths of 70,000 German and Austrian individuals with physical and mental disabilities, and these mass murders provided the knowledge and technical framework for the later development of Concentration Camps (Friedlander, 1997; Lifton, 2017; Proctor, 1988).

Today, individuals with disabilities continue to face higher rates of abuse, limited access to education and positions of power, and underrepresentation in mainstream settings (Goodley, 2011). Employment rates for Canadians with disabilities aged 25 to 64 are lower than for those without disabilities, and the likelihood of being employed decreases significantly as disability severity increases (76% for mild vs. 31% for severe disabilities; Statistics Canada, 2018, 2022). Canadians with disabilities are also more likely to live in poverty (28% vs 10% for non-disabled individuals; Statistics Canada, 2018, 2022). This systemic marginalization severely harms the psychological well-being and quality of life of people with disabilities (Schmitt et al., 2014). In response, the 21st century has seen a political shift emphasizing equity and integration into society through policy change and increased legal protection. For example, in 1982, the Canadian Charter of Rights and Freedoms was changed to identify people with disabilities as a disadvantaged group (Jongbloed, 2003). International organizations, such as the United Nations and the World Health Organization, instituted various mandates and strategies promoting the well-being and rights of people with disabilities [see Hurst (2003) and Lang (2009) for review].

Despite the multitude of policy changes aimed at increasing public acceptance of disability, able-bodied individuals continue to experience discomfort around those with disabilities (Park et al., 2003). Individuals with disabilities, both visible and invisible, often face persistent stigma and discrimination, with many reporting negative perceptions from able-bodied

individuals (Moore et al., 2011; Park et al., 2003). Stigma can be defined broadly as the social devaluation of individuals or groups based on a perceived different or identity that distinguishes them from others (Crocker et al., 1998; Goffman, 1963). An individual is stigmatized when the possess (or are perceived to possess) an attribute or trait that marks them as different (Oaten et al., 2011). This trait can be visible or invisible, controllable or uncontrollable, and/or linked to group membership (e.g., racial groups), behaviour, and appearance (e.g., morphological differences; Major & O'Brien, 2005).

Research on stigma has largely focused on racial and ethnic minorities, with less attention given to disability stigma (Bogart et al., 2019). Existing theories of prejudice, such as ambivalent attitudes, interactional uncertainty, belief in a just world, attribution theory, and attachment theory, have been adapted to explain discriminatory reactions towards disability (Dovidio et al., 2011; Heatherton et al., 2000). While these models may apply, this study adopts an evolutionary psychological approach to builds on and complements these other perspectives and offer a nuanced understanding of disability stigma. The lasting presence of stigmatizing attitudes and stereotypes related to disability throughout history and across cultures suggests that there is an innate component to this phenomenon (Kurzban & Leary, 2001; Park et al., 2003). We propose that that overgeneralized BIS responses to non-contagious disease cues, such as those associated with disabilities, may partly explain this stigma. Although direct empirical tests of this hypothesis are limited, some studies suggest that the affective, cognitive, and behavioural reactions toward people with disabilities often mirror those shown toward infected conspecifics and pathogens (Park et al., 2003).

A handful of studies suggest disgust plays a role in aversive responses toward disabilities. As discussed earlier, disgust likely evolved to aid pathogen avoidance (i.e., Curtis et al., 2004;

Curtis et al., 2011; Oaten et al., 2009; Schaller, 2014; Tybur et al., 2009), with bodily wastes, such as feces, being one of the strongest universal disgust cues (i.e., Curtis & Biran, 2001; Tybur et al., 2013). Smith and colleagues (2007) examined whether disgust predicted stigmatizing attitudes towards individuals with a colostomy, a medical procedure where the contents of one's bowels are redirected into an external colostomy bag. A colostomy bag is concealed under clothing, especially loose-fitting garments, but users may experience odours and noises caused by gases and wastes passing into the bag, particularly when emptying it. Emptying of the bag also requires closer contact with fecal matter than normal bowel function, which may trigger enhanced disgust reactions in others. The study found that healthy participants with high disgust sensitivity reported a greater desire to distance themselves from those with a colostomy ($r = .22$, $p < .001$). Interestingly, colostomy users with higher disgust sensitivity reported lower life satisfaction, felt more stigmatized, and anticipated disgust from others (Smith et al., 2007), a finding replicated by other studies (i.e., Jin et al., 2020; Reynolds et al., 2015; Yuan et al., 2018).

Disgust overgeneralization also contributes to the stigmatization of individuals with mental health conditions, which are invisible disabilities that can significantly interfere with daily functioning (Mullins & Preyde, 2013). Dawydiak et al. (2020) were the first to test the relationship between pathogen disgust and stigma toward individuals with three different mental health conditions: (a) Schizophrenia; (b) skin picking disorder; and (c) sexual sadism disorder. They identified a positive relationship between pathogen disgust and stigmatization of individuals with the above-mentioned mental health conditions. Similarly, Papathanasiou and Stylianidis (2022) found that mental health professionals (e.g., psychologists, psychiatrists, nurses, social workers, and mental health counsellors) high in disgust sensitivity and disgust propensity exhibited more negative attitudes towards individuals with borderline personality

disorder. These findings suggest that disease-avoidant mechanisms, such as disgust, operate in an over-inclusive nature, contributing to the stigma surrounding non-contagious disabilities.

Qualitative work highlights the tendency to equate disabilities with disgust, particularly through the use of language, by using words such as “unclean”, “diseased”, “contaminated”, “unsightly”, and “disgusting” to describe people with disabilities (Covey, 1998; Reeve, 2015; Schweik, 2009). A critical analysis of Australia’s welfare policies found that disgust-based rhetoric was used to separate and exclude people with disabilities to redefine them as ‘undeserving’ of welfare, further constraining the rights of those living with disability (Soldatic & Pini, 2009). Indirect evidence connecting disgust with negative perceptions of disability comes from studies of individuals possessing non-normative morphological traits, such as facial anomalies (i.e., Ryan et al., 2012; van Leeuwen & Jaeger, 2022), obesity (i.e., Lieberman et al., 2012; Vartanian et al., 2016), and signs of old age (i.e., Cao et al., 2022), which were discussed earlier in this paper.

The above works demonstrate the ease with which the BIS can misinterpret benign, non-contagious cues as pathogenic, due to their deviations from the prototypical norm. It could be argued that disability may be perceived as deviating from the healthy norm due to physical markings (e.g., missing limbs, scars, asymmetrical faces), behaviours (e.g., hallucinations, twitching) or other features, such as limping or close contact with bodily fluids (e.g., urinary catheterization, colostomy). Moreover, certain attributes associated with disabilities can sometimes share perceptual features with true pathogenic cues (i.e., facial blemishes, wounds following an accident) or indicate a higher presence of pathogens (i.e., poor hygiene behaviours, colostomy), which may increase the likelihood of disability triggering disgust in perceivers. However, no studies have directly tested this hypothesis to date.

Additional evidence supporting the idea that evolved disease-avoidance mechanisms innately influence disability-related perceptions come from the study of implicit and explicit attitudes and non-verbal behaviour. These complex evaluations reflect the extent of an individual's liking or disliking of a particular stimulus based on cognitive, affective, and behavioural information (Wilson & Scior, 2015). Explicit attitudes are consciously accessible and controllable evaluations that are deliberately formed and easy to report (Wilson & Scior, 2015). Explicit attitudes are much easier to verbally express due to their conscious basis. Implicit attitudes are involuntarily formed in the unconscious, automatically activated without effort, and many individuals are often unaware of their implicit attitudes (Wilson & Scior, 2015).

Most research on the contents of disability-related attitudes has used the IAT (Greenwald et al., 1998; see Wilson & Scior, 2014 for review). The strongest evidence corroborating the idea that people with disabilities are misperceived by the BIS as sources of pathogens comes from Duncan (2005) and Park and colleagues (2003). Duncan (2005) found that even when participants had rational health knowledge explicitly stating the pathogenic risk of male targets presented in a photo, the concept of disease was more strongly associated with a healthy man possessing a heuristic disease cue, a facial birthmark during IAT trials, than with a diseased man who appeared healthy. Likewise, Park et al. (2003) used an IAT paradigm to examine the implicit relationship linking physical disability and disease-relevant concepts, priming some participants with a news article describing a contagious disease outbreak. Among participants of European descent, those more concerned with germs (high GA scores on PVD measure), had stronger cognitive associations linking disability with disease than those with lower GA scores. As compared to the control condition, those primed with pathogenic concerns were significantly quicker to associate disability with disease. Participants with an Asian heritage that were highly

disgust sensitive also showed stronger disability-disease associations. In this case, a heightened fear of disease, either as a chronic trait (DS), or temporarily as the result of an experimental manipulation (PVD), lead to more severe stigmatizing perceptions of people with disabilities.

Thomas, Doyle, and Vaughn (2007) compared implicit and explicit attitudes towards disabilities with varying visibility such as: (a) Alcoholism; (b) Cancer; (c) Mental Illness; and (d) Paraplegia. Overall, participants were quicker at associating the disabilities with negative words than with positive words. Participants required more cognitive processing time when disabilities with higher visibility, such as paraplegia and cancer, were paired with positive words than when these conditions were paired with negative words, indicating greater potential for biased attitudes towards these conditions. In contrast, less visible disabilities, such as alcoholism and mental illness, did not elicit the same delayed response when paired with positive words, suggesting less bias. The findings obtained by Thomas et al. (2007) indicate that some disabilities are more readily associated with negative concepts than other disabilities.

Further evidence of the BIS involvement in perceiving disease in disability comes from experiments linking disability with general semantic concepts such as “bad” and “unpleasant”, words that are often used to describe pathogen exposure and infection (i.e., Curtis & Biran, 2001; Olsson et al., 2014). Pruett and Chan (2006) developed the *Disability Attitudes Implicit Associations Test* (DA–IAT) to assess implicit attitudes specific to physical disabilities (motor or visual), using disability and non-disability symbols as stimuli, rather than words. Analysis of DA–IAT scores demonstrated that participants were significantly faster associating negative words with disability-related symbols and positive words with nondisabled symbols than associating positive words with disability-related symbols and negative words with nondisabled symbols, indicating a stronger implicit bias against disability. In another study using the DA–

IAT, Chinese college students were significantly more likely to associate disability symbols with negative words, and this effect was especially pronounced among students from rural settings.

Recent research investigating undergraduate students' perceptions of different disabilities (i.e., physical disability, mental illness, ADHD, HIV/AIDS) across a variety of social contexts (i.e., marriage, friend, coworker) found a hierarchy of preference toward these disabilities (Huskin et al., 2018). Individuals living with HIV/AIDS, mental illness, intellectual disability, and autism were perceived most negatively by participants, with many self-reporting they would avoid contact with individuals with these conditions (Huskin et al., 2018). This aligns with existing research showing that disabilities related to communicable diseases are least preferred, followed by mental health conditions, with physical disabilities (i.e., motor disorders) being most preferred (Deal, 2003; Thomas, 2000; Tringo, 1970). Participants also reported an equally strong desire to increase social distance from both a contagious disabling condition (i.e., HIV/AIDS) and non-contagious conditions (i.e., mental illness; Huskin et al., 2018). Since the risk of overlooking pathogens makes it evolutionarily adaptive for the BIS to err toward false alarms, it is unsurprising that non-contagious disabilities are grouped with contagious conditions and treated similarly with avoidance.

Studies of nonverbal behaviours demonstrate that able-bodied individuals experience discomfort when interacting with people with disabilities in the form of behavioural "stiffness". In one study, participants interacting with a research assistant (RA) portraying a physical disability in the form of a leg amputation exhibited less movement and greater motor inhibition compared to when interacting with a healthy RA (Kleck, 1968). In another study, children interviewed by an RA wearing a leg brace and carrying a crutch engaged in fewer self-manipulatory behaviours (i.e., playing with hair or touching one's face) and stared more at the

RA's leg compared to when the RA appeared nondisabled (Sigelman et al., 1986). The parents of these children also stood closer to their children during the interview, possibly indicating a protective response while also reflecting the parents' own tendencies to perceive a threat in disability (Sigelman et al., 1986). Even raters unaware of study hypotheses observe interactions between able-bodied participants and individuals with a disability, those interacting with people with disabilities were judged as being less relaxed and less comfortable with the interaction (Heinemann et al., 1981). People also tend to smile less when social interacting with individuals with a physical disability (Comer & Piliavin, 1972). The above studies indicate a pattern of discomfort experienced during interactions with people with disabilities. Indeed, participants sitting next to an individual in a wheelchair at the movie theatre self-reported feeling "tense", "jittery", and "on edge" (Snyder et al., 1979). Importantly, similar behavioural modifications are observed in response to true pathogenic cues. For example, participants expressed equal levels of disgust and touch avoidance of objects handled by someone with a facial birthmark and someone infected with influence (Ryan et al., 2012).

A key tenet of BIS theory is that the BIS evolved to pre-emptively detect pathogens and prevent contact with them through adaptive behaviours, such as maintaining physical distance from the perceived source of pathogens (Neuberg et al., 2011; Murray & Schaller, 2016; Oaten et al., 2009; Schaller, 2006, 2016; Schaller & Duncan, 2007; Tybur & Lieberman, 2016). Many studies, described earlier, demonstrate the strong desire people feel to distance themselves from pathogens (e.g., Blacker & LoBue, 2016; Makhanova & Shepherd, 2020; Park, 2015; Pazhoohi & Kingstone, 2022). The fact that the same type of avoidance behaviour is elicited in the presence of people with disabilities, namely the tendency of some individuals to avoid or keep

greater distance from people with disabilities implicates the BIS and evolved-disease avoidance mechanisms in shaping perceptions of disability.

As a first example, participants interviewing an individual with a disability terminated interviews sooner than with a non-disabled individual, illustrating a strong desire to quickly physically distance themselves from the candidate with a disability (Kleck et al., 1966). Participants also choose to sit further away from an RA in a wheelchair than from an RA who is healthy (Heinemann et al., 1981). Maintaining greater interpersonal distances during interactions is also evidenced in response to those with invisible disabilities, such as those with epilepsy (Kleck et al., 1968). Participants sat further away from an interviewe4r who disclosed having epilepsy, compared to when epilepsy was not mentioned (Kleck et al., 1968). Restaurant customers with a physical disability were observed to wait twice as long for a waitress to approach their table and had fewer interactions with the waitress than their non-disabled counterparts (Thompson, 1982). Lastly, Snyder et al. (1979) demonstrated that when given the choice, participants preferred not to sit next to a RA with a disability, citing movie preference as the deciding factor and the justification for distancing. However, when the choice of movie was removed, participants sat next to the RA with a disability. Given the push for increased social inclusion of people with disabilities, findings such as this one reveal that while people may express support for inclusion of individuals with disabilities (or act in ways that suggest this), they may only do so as a means of presenting themselves in a socially desirable way in line with expected social norms since their implicit attitudes still favour avoidance.

The studies reviewed here clearly indicate there is a relationship between evolved disease-avoidance mechanisms, such as the BIS, and the stigmatization of people with disabilities. Being alienated from one's community on the grounds of possessing features that

deviate from the expected norm which may be misperceived as pathogenic is detrimental to the overall well-being of those living with disability. Understanding the evolutionary basis of these behaviours is crucial to the development and implementation of programs and policy changes that succeed in enhancing positive attitudes towards disability.

Disability Self-Disclosure

Disability stigma may be affected by self-disclosure, a process where individuals intentionally share personal information, which is essential in building and maintaining relationships, increasing intimacy, and reducing social uncertainty in social interactions (Tardy & Smithson, 2018). Self-disclosure varies in intensity and frequency, with the decision to self-disclose dependent on many factors. Individual factors (e.g., personality and attachment) and contextual factors (e.g., context, setting, and needs/goals), shape when and how self-disclosure occurs, as people assess the costs and benefits of sharing personal information (for review, see Tardy & Smithson, 2018; Yanos et al., 2015). Benefits include gaining social support, relationship satisfaction, a heightened sense of belonging, and being understood and accepted for who you are (Tardy & Smithson, 2018). But self-disclosure can be harmful, especially when unreciprocated or when the information elicits rejection or discrimination, significantly impacting future intentions to share personal information again (Tardy & Smithson, 2018). Non-disclosure can also negatively impact relationship-building and psychological well-being, as concealing aspects of one's identity demands ongoing conscious effort and hypervigilance that can worsen distress and increase social isolation (Pachankis, 2007; Tardy & Smithson, 2018). Ultimately, this exchange of information helps individuals assess the future potential for a relationship (e.g., friendship, romance, professional colleagues) and decide whether they would like to continue building a closer relationship (Derlega et al., 2008). Disclosure thus serves as a

mechanism to reveal one's "real self" to others (Greene et al., 2006) and regulates social relationships and interactions (Tardy & Smithson, 2018).

As with self-disclosure, disability disclosure involves deciding what information to disclose to whom and why, how to disclose the information, and when and where disclosure should take place (Valle et al., 2004). This is a complex and sensitive process for those with stigmatized identities since sharing disability information can expose them to judgement. Disclosing one's disability status is an ongoing practice that requires navigating disability in a variety of settings and contexts, where the costs and benefits of revealing personal information vary widely (Barnard-Brak et al., 2010).

Research on disability disclosure has mainly been qualitative and focused on the impact of disclosure on workplace/academic accommodations and outcomes (e.g., maintaining employment, academic achievements). The primary reasons for disability disclosure in these contexts include: (a) receiving assistance and accommodations; (b) giving legitimacy to one's disability; (c) clarifying aspects of the disability; and (d) due to workplace/academic policies and legislation (Eccles et al., 2018; Evans, 2019; Gignac et al., 2021; Gignac et al., 2022; Kendall, 2016; Lindsay et al., 2018; Lindsay et al., 2019; Mamboleo et al., 2020; Marshall et al., 2020; Melian & Meneses, 2022). The most cited reasons for not disclosing one's disability status are fear of rejection, discrimination, lost opportunities, unfair treatment, perceivers' lack of knowledge about disability, and past negative experiences (Brohan et al., 2012; De Cesarei, 2015; Eccles et al., 2018; Grimes et al., 2020; Kimball et al., 2016; Lindsay et al., 2018; Mamboleo et al., 2020; Marshall et al., 2020; Melian & Meneses, 2022; Toth & Dewa, 2014). For example, students fear that disability disclosure will differentiate them from peers and jeopardize their admission or experience in higher education (Eccles et al., 2018). Similarly,

workers with disabilities avoid disclosing their status to secure job interviews or career advancement opportunities (Gignac et al., 2021; Marshall et al., 2020; Osterud, 2023). The reluctance to disclose disability status is also evident in challenges collecting disability data, since individuals withhold their conditions due to perceived stigma (Blaser & Ladner, 2020).

Disability researchers are particularly interested in disclosure strategies used by individuals with invisible disabilities, who are believed to have a more complex relationship with disclosure due to their unique ability to conceal their condition and "pass" as non-disabled. Many people with invisible disabilities choose not to self-disclose disability to appear and be treated "as normal" (e.g., Eccles et al., 2018; Melian & Meneses, 2022; Morina, 2022) and research has shown that those with visible disabilities are more likely to disclose their status than those with hidden disabilities (e.g., De Cesarei, 2015; Jarkestig Berggren et al., 2016; Lindsay et al., 2013; Melian & Meneses, 2022; Weedon & Riddell, 2009). This may be due to the visible nature of the disability, making disclosure somewhat involuntary (Melian & Meneses, 2022) and "to get it [disability disclosure] out of the way" (e.g., Lindsay et al., 2013). Indeed, Canadian university students with invisible disabilities express a desire for a concealable physical manifestation of their condition to control disclosure by deciding when to make their disability apparent or not apparent (Mullins & Preyde, 2013).

Considering the benefits and potential harms of disclosure and non-disclosure, disability researchers have sought to understand the disclosure strategies used by people with disabilities. Early research viewed the process of disclosure as homogenous, focusing on the extremes of full disclosure versus full concealment (Clair et al., 2005). This work helped build knowledge of the individual and contextual factors that inform self-disclosure, while also revealing that, like disabilities, disclosure strategies are heterogenous. More recent literature shifts focus away from

this binary to explore within- and between-person factors contributing to distinct disclosure strategies, such as the amount of information shared (Lyubykh et al., 2021), to distinguish between different approaches used during instances of disability disclosure.

According to Lyons et al. (2018), disclosure strategies are used to manage perceivers' evaluations of what a disability means and fall into two broad categories: a) claiming; or b) downplaying. Claiming emphasizes the positive aspects of a disability to reshape negative stereotypes. For example, a student with ADHD might highlight how their condition aids in producing high-quality essays on topics they're passionate about. Downplaying reflects an attempt to shift focus away from the undesirable characteristics associated with the disability. For example, a worker with a physical disability may emphasize their condition is managed and does not affect productivity. Individuals may use either or both strategies during disability disclosure by gauging the reactions of the perceiver. In comparing the two strategies, claiming is significantly associated with the discloser being perceived as more competent, whereas downplaying is weakly associated with the discloser being perceived as less competent.

Building on the work of Lyons et al. (2018), Evans (2019) specifically examined the disclosure strategies of those with invisible disabilities and identified three primary forms: (a) confessional; (b) pragmatic; and (c) validating. Confessional disclosure involves revealing impairment to explain perceived shortcomings or justify requests (e.g., accommodations, help). This approach is often associated with feelings of shame, embarrassment, and guilt on the behalf of the discloser, as reflected by language used is confessional disclosure (e.g., "fessing up", "being caught"). Pragmatic disclosure conveys disability information in a practical and straightforward manner, with the goal being to manage others' expectations. For example, someone with depression may explain to a friend why they sometimes lack energy for their

friendship. Validating disclosure seeks to foster open dialogue about the disability, connect with others, and validate one's disability identity and their lived experience. These strategies are not mutually exclusive and may be used in different combinations depending on the situation. Ultimately, Evans' (2019) study concluded that individuals with invisible disabilities sometimes disclose their condition to gauge perceivers' reactions and differentiate between allies and those with negative biases towards disability.

The research above was conducted in academic and workplace contexts and has been criticized for overlooking the fact that disability disclosure in these settings often occurs out of necessity, rather than when the discloser feels ready to disclose in a way that is comfortable for them. Furthermore, studies examining disability disclosure strategies focus on the subjective experience of the discloser, with little attention given to how the contents of impairment disclosure and the timing affect perceivers' attitudes towards the discloser, especially in the context of friendship. A prerequisite for disclosing disability to friends or loved ones is having an established trusting relationship (Wang, 2014), whereas disclosure in academic and workplace settings is typically driven by the need for accommodations, not prior trust (Melian & Meneses, 2022). Another critique is the lack of focus on how and when to disclose impairment information. Minis et al. (2014) has shown that youth with neuromuscular disease and other varying conditions (e.g., visual impairments, ADHD, cerebral palsy) are uncertain about how and when to disclose their disability. These research gaps are concerning because past negative disclosure experiences and perceivers' lack of knowledge surrounding disabilities can hinder sharing disability status. There is a need for more research on how the degree and timing of disability disclosure impacts perceivers, as this knowledge will provide individuals with disabilities with evidence-based tools that enhance the positive effects of disclosure while

minimizing the negative ones (Compas et al., 2012; Hyseni et al., 2022; Lindsay et al., 2018; Lingsom, 2008; Shpigelman & Vorobioff, 2021).

To date, a limited number of studies have explored how the contents of disability disclosure or timing influence perceivers' reactions toward the discloser. First, Spirito et al. (2008) manipulated the type of disability (physical, psychiatric, and no disability) and the extent of disability disclosure (brief vs detailed) to observe how these factors impacted employers' hiring decisions and perceptions of employability. The extent of disclosure had no significant effect on either hiring decisions or employers' perceptions of employability, but disability type had a significant effect. Employers rated an applicant with mental illness (bi-polar) as less employable than an applicant with a physical disability (insulin-dependent Diabetes), regardless of the extent of disclosure. These findings suggest that the type of disability, rather than the amount of information disclosed about the disability, influences whether an individual with a disability is perceived positively or negatively. However, this study requires replication with a broader range of disabilities, as the findings may be specific to the two conditions studied or to those the general public is more familiar with. Next, Shpigelman and colleagues (2019) examined how the timing of disability disclosure influences perceivers' experience of disability disclosure in the context of romantic relationships. Researchers conducted interviews with five participants whose intimate partners disclosed having a mental health condition (e.g., OCD, bipolar disorder, schizophrenia) while dating. They found that the participants who were informed of their intimate partner's condition later in the relationship (e.g., 6 months to 2 years) experienced strong negative feelings such as anger, shock, betrayal, and being misled, and some indicated they might have ended the relationship had the disclosure occurred earlier. Comparatively, Hebl and Skorinko (2005) examined how the timing of physical disability

disclosure during a job interview influenced perceptions of the applicant. Applicants who mentioned their physical disability at the beginning of their interview were rated as being happier and having greater psychological well-being, resulting in more favourable evaluations than applicants who disclosed their disability status later in the interview or did not disclose at all.

Perceived and anticipated stigma and discrimination, perceivers' lack of knowledge about disabilities, and past negative experiences are key reasons individuals hesitate to disclose their disability status. Thus, investigating the contents of impairment disclosure and timing is exceptionally important. The lack of research on perceivers' experiences of disclosure, particularly in friendships, is alarming since disclosers anticipate and/or perceive stigma following disclosure but little is known about the aspects of disclosure that may reduce this stigma. Moreover, there is little consensus among researchers on which disclosure strategies (e.g., the amount and timing of information shared) are most successful in enhancing positive disability attitudes. For example, it's unclear whether providing detailed disclosure early or sharing brief disclosures over time is more effective. Understanding how sharing a lot (high self-disclosure) versus a little (low self-disclosure) about one's disability status when first meeting someone shapes perceivers' perceptions of, and attitudes towards, individuals with a disability is crucial.

Intermittent Self-Catheterization

No research has examined factors that affect perceivers' attitudes towards individuals with invisible disabilities who use intermittent self-catheters to urinate. Although not a disability itself, intermittent self-catheterization (ISC) is commonly used by individuals who have difficulty urinating due to various medical conditions, such as neurogenic bladder dysfunction, Spina Bifida, Multiple Sclerosis, and spinal injuries/trauma (Cobussen-Boekhorst et al., 2016;

Crescenze et al., 2019; Lapides et al., 2002; Ramm & Kane, 2011). ISC involves inserting a thin, flexible tube called a catheter into one's bladder to empty urine when an individual is unable to do so naturally (Ramm & Kane, 2011). A urinary catheter is a thin lubricated tube with one open end, like a straw, and a closed end with two small, perforated holes. The closed end with the small, perforated holes is lubricated, and then inserted up the urethra where it enters the bladder, allowing for full urine elimination. Once complete, the catheter is removed and disposed of. Depending on bladder size and fluid intake, ISC may be required 4 to 8 times a day.

Research on ISC has focused mainly on evaluating the clinical/therapeutic success or failure of ISC treatment (e.g., Crescenze et al., 2019; Greenwell et al., 2016; Lane et al., 2017; Pickard et al., 2018), adherence rates (e.g., Afsar et al., 2013; Cobussen-Boekhorst et al., 2016; Girotti et al., 2011), financial impact (e.g., Bermingham et al., 2013; Watanabe et al., 2017) and how best to teach ISC to users (e.g., Balhi & Mrabet, 2020; de Lima et al., 2022). A further limitation of this body of work is that many studies fail to consider how sex and gender may differentially impact attitudes towards ISC (e.g., Girotti et al., 2011; Shaw et al., 2008), despite the lack of data showing a higher prevalence of ISC use in either women or men. Instead, most studies, both qualitative and quantitative, combine female and male experiences with ISC (e.g., Greenwell et al., 2016; Pickard et al., 2018; Watanabe et al., 2017), which limits the ability to generalize findings to both sexes because participants in these studies have predominantly been male (e.g., Afsar et al., 2013; Bermingham et al., 2013; Cobussen-Boekhorst et al., 2016; Crescenze et al., 2019; Lane et al., 2017; Pickard et al., 2018; Shaw et al., 2008; Wilde, 1999, 2003).

The literature on female-specific experiences with ISC is limited to investigation of clinical outcomes (e.g., Jannelli et al., 2007; Lindehall et al., 2007; Pickard et al., 2018) and

often involves small sample sizes (e.g., 4 female participants: Hakenberg et al., 2001; 31 female participants: Lindehall et al., 2007; 5 female participants: Ramm & Kane, 2011), or derives findings from samples made up of both males and females (e.g., Hakenberg et al., 2001; Kelly et al., 2014; Lapides et al., 2002; Pickard et al., 2018; Wilde, 1999, 2003). ISC has been shown to decrease the frequency of urinary tract infections and other urinary complications among women with underlying urological conditions (e.g., bladder outlet obstruction; Lapides et al., 2002), urinary retention (Weynants et al., 2017), neurogenic bladder disorder (Hakenberg et al., 2001), and Spina Bifida (Campbell et al., 2004). However, women who experience more difficulty using ISC or pain show less interest in continuing its use (Jannelli et al., 2007). Studies that seek to investigate the quality of life of females using ISC beyond the benchmark of clinical success or failure appear to be entirely qualitative (e.g., Kelly et al., 2014; Ramm & Kane, 2011). In short, very little is known about the specific factors shaping the lived experience of women using ISC, as this group has rarely been studied separately from men in ISC literature.

Qualitative research provides a more nuanced understanding of the positive and negative aspects of ISC for women (Kelly et al., 2014; Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 1999, 2003). Two common themes that emerge from this work is the perceived stigma related to bladder control issues (e.g., Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 2003) and challenges with ISC disclosure (e.g., feelings of shame, embarrassment) across a variety of contexts and relationships (e.g., Kelly et al., 2014; Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 2003). Many women are reluctant to share their ISC use with friends, family, and romantic partners of many years (Kelly et al., 2014; Shaw et al., 2008). They also avoid using public restrooms or their friends/family members' bathrooms to conceal ISC packaging and avoid potential disclosure (Kelly et al., 2014; Pickard et al., 2018; Shaw et al., 2008).

Additionally, women who use ISC report anticipating stigma from others in response to ISC-related issues, such as judgement over bladder control issues (Kelly et al., 2014; Shaw et al., 2008), inability to access appropriate washroom facilities to properly carry out ISC and/or taking longer in the washroom (Kelly et al., 2014; Ram & Kane, 2011; Shaw et al., 2008), and occasionally requiring assistance with using ISC (Shaw et al., 2008). Women using ISC frequently express their strong desire for discretion and privacy, driven by concerns about stigma and fear of being "discovered" (Kelly et al., 2014; Ramm & Kane, 2011; Shaw et al., 2008). Interestingly, when urologists were asked about their perceptions of ISC, a small portion (10%) reported that they found the treatment unpleasant (Weynants et al., 2017).

The above findings echo the experiences of individuals with other invisible disabilities, who often hide their conditions because they are unsure how to disclose, to avoid stigma, and be treated as "normal" (e.g., Mullins & Preyde, 2013). For women using ISC, the primary coping mechanism that predicts adherence to ISC is normalization (Kelly et al., 2014; Pickard et al., 2018; Ramm & Kane, 2011; Wilde, 2003). These women often experience feelings of loss and grief upon first learning they need ISC (Ramm & Kane, 2011; Shaw et al., 2008) and feel less feminine and satisfied with their sexual and romantic lives as a result (Ramm & Kane, 2011). Normalization of ISC occurs when women recognize ISC's benefits, such as attending social events or engaging in activities (e.g., going to the gym) without experiencing incontinence, feeling more comfortable throughout the day, and alleviating UTIs (Kelly et al., 2014; Pickard et al., 2018; Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 2003). This process helps women view ISC as "part" of themselves, allowing greater acceptance of, and adjustment to, ISC (Kelly et al., 2014; Pickard et al., 2018; Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 2003).

To conclude, research on ISC has largely overlooked the unique experience and challenges faced by women using ISC. The underrepresentation of women in ISC studies and lack of focus on sex differences has left a significant gap in understanding their specific needs and perspectives. For example, while women using ISC perceive and anticipate stigma from others (Kelly et al., 2014; Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 2003), research has yet to investigate whether this stigma exists or explore its mechanisms. Addressing these gaps requires a more comprehensive investigation into women's lived experiences with ISC, which is essential for developing targeted interventions, improving healthcare outcomes, and enhancing quality of life. Furthermore, quantitative research is needed to assess perceptions of ISC, identify negative attitudes and their causes, and explore self-disclosure strategies that improve attitudes towards ISC.

Empathy

A vital component of human social life, empathy allows individuals to build and maintain meaningful social relationships. Although there is a lack of consensus among researchers as to how empathy should be defined (i.e., Clark et al., 2019; Eklund & Meranius, 2021), the varying definitions share common themes. Based on these themes, empathy can be broadly conceptualized as the ability to understand, feel, and share the emotions of others, while maintaining self-other differentiation (Eklund & Meranius, 2021). Most researchers agree that empathy has two major components: 1) cognitive empathy, and 2) affective empathy (Cuff et al., 2016; Decety, 2011; Decety & Cowell, 2015; Di Girolamo et al., 2019; Guthridge & Giummarra, 2021; Hall & Schwartz, 2019; Harmsen, 2019; Kerr-Gaffney et al., 2019; Kimmig et al., 2021). Cognitive empathy involves adopting another individual's point of view (e.g., perspective-taking) to understand their perspective and infer their thoughts and feelings (Batchelder et al.,

2017; Decety, 2011; Decety & Cowell, 2015). Affective empathy refers to one's ability to recognize, be sensitive to, and share another's emotional experiences (Decety, 2011; Decety & Cowell, 2015; Winters et al., 2021). Empathy gives individuals insight into the actions of others and facilitates unselfish, prosocial behaviour (Decety et al., 2016). Although empathy has been identified as a key driver for prosocial behaviours not everyone is equally inclined to help others. Some researchers argue that empathy is a relatively stable personality trait that can vary in intensity between individuals (e.g., Leiberg & Anders, 2006), and other researchers posit that empathy is a situation-specific affective-cognitive state (Duan & Hill, 1996).

There is a robust amount of evidence suggesting that negative attitudes toward stigmatized groups can be reduced by eliciting empathy. Generally, increased empathy has been associated with more positive attitudes towards stigmatized individuals and groups, including racial minorities (Cheung et al., 2017), immigrants (Oliver et al., 2012), the homeless (Batson et al., 1997), prisoners (Oliver et al., 2012), convicted murderers (Batson et al., 1997), individuals with a substance use disorder (Batson et al., 2002), sex workers (Silver et al., 2015), members of the queer community (Hodson et al., 2009), and obesity (Gloor & Puhl, 2016).

With respect to disability, data from a number of studies done from various different theoretical standpoints encourage the development of empathy as a potential protective factor that may help reduce disability stigma. Moreover, the effect of empathy on disability stigma has been observed cross-culturally in response to both visible and invisible disabilities. Webb et al. (2016), measured American university students' empathy and stigmatizing attitudes towards an individual's behaviours as caused by either: a) schizophrenia; b) bipolar disorder; c) "a severe psychological disorder"; d) Alzheimer's disease; or e) homelessness. Correlational results revealed a significant negative relationship between empathy and disability-related stigma, and

empathy was found to be a significant predictor of stigma in regression analyses. Students with higher levels of empathy exhibited less disability stigma in response to the various disabling conditions. More recently, Sharma et al. (2021) found a strong positive correlation between scores on a measure of attitudes toward individuals with disabilities and a measure of empathy, such that Indian participants with higher levels of affective empathy held more positive attitudes toward physical disability.

Empathy has also been shown to be a significant factor in shaping teachers' attitudes toward disability, both visible and invisible (Barr, 2013; Parchomiuk, 2019). Teachers with greater levels of empathy were less likely to show stigmatizing attitudes towards students with disabilities (Barr, 2013; Parchomiuk, 2019). Next, viewing empathy-inducing YouTube content (Oliver et al., 2013) and videos portraying people living with a mental illness (Hecht et al., 2022) resulted in less mental health stigma, and increased positive attitudes and more prosocial behavioural intention towards individuals with mental health conditions. Similarly, inducing empathy via a short story narrative about an individual with severe depression led to more positive attitudes toward the individual and greater intentions to help (McKeever, 2015).

Given the promising findings highlighting the link between empathy and more positive perceptions of disabilities, many interventions aim to reduce disability stigma by focusing on increasing empathy in perceivers. This is exemplified by the work undertaken by Geçkil and colleagues (2017) who tested the efficacy of disability empathy activity training, which consisted of modules tapping into aspects of both cognitive and affective empathy, in increasing positive attitudes of nursing students toward people with disabilities. Nursing students' attitudes toward disability were collected at baseline, two months (T2) and then six months (T3) following the empathy intervention. Positive attitudes toward disability were significantly greater in the

experimental group at T2 and T3 than for the control group, providing evidence that empathy interventions used to understand the lived experience of people with disabilities positively affected the attitudes of nursing students toward disability, and this effect was maintained over time. These results are in line with those obtained by other researchers showing that empathy training methods (e.g., simulation, empathy activities, watching empathy-enhancing media content) support the development of positive disability attitudes among nursing students (Choi & Song, 2007; Levett-Jones et al., 2017; McArthur et al., 2016), and the general public (Ahn et al., 2013; Bartsch et al., 2018).

Evolutionary psychologists argue that empathy may have evolved as a motivator to help and care for sick or injured kin as a means of improving group survival rates (Steinkopf, 2017). This view positions empathy as the antithesis of disgust since the underlying mechanisms of disgust are hypothesized to have developed to avoid potential sources of infectious pathogens. Thus, the presence of a sick person induces two contradictory behavioural strategies; observers may feel empathy and be motivated to help, or they may feel disgusted and be motivated to avoid the sick (Neuberg et al., 2011; Steinkopf, 2017). The empathic reaction reflects an altruistic strategy of helping as explained by kin selection and reciprocal altruism toward non-kin, whereas disgust is related to self-protection as explained by pathogen avoidance (Steinkopf, 2017).

To illustrate this, Steinkopf (2017) offered a conceptual framework linking disgust and empathy in the domain of caring for the sick to provide an explanation as to how the two conflicting mechanisms of disgust and empathy operate together to bring about adaptive behaviour. Caring for kin and offspring pays off in terms of increasing one's inclusive fitness while helping non-kin acts as a prosocial "insurance" plan that builds one's reputation and increases trust, which may encourage reciprocal support from others when needed. However,

helping others involves costs such as exposure to pathogens and a loss of time and resources (e.g., energy) that can't be spent on other fitness-enhancing activities. Avoidance, by contrast, prevents infection and conserves resources but may reduce fitness if it involves neglecting kin, and can result in missed opportunities for bonding or building trust within a group.

The trade-offs between the costs and benefits of caring for the sick are situation dependent. According to Steinkopf (2017), the factors most crucial in influencing the choice between helping and avoidance are: a) the severity of the sufferer's condition; and b) the relationship between the sufferer and observer/helper. Condition severity heightens both empathy and disgust. The severity of the sufferer's condition can signal an immediate need for help from the observer, potentially leading to more empathy and helping behaviour. Severe conditions can also lead to more disgust and less helping behaviour by signalling the risk of potential infection with dangerous pathogens. Additionally, for helping behaviour to operate as an insurance policy increasing the chances of reciprocal helping in the future, the observer must encounter the sufferer again, which is more likely when both parties share common group membership, are socially close, and familiar with one another. There is also a lower probability that in-group members and familiar individuals will introduce novel pathogens that other group members' immune systems have not adapted to. Therefore, common group membership, familiarity, and social closeness also regulate both empathy and disgust by decreasing disgust and increasing empathic behaviours

Although the motivation to help produced by empathy is in direct conflict with the motivation to avoid produced by disgust, they work together to consolidate the costs and benefits of helping and/or avoiding the sick to optimize behaviour. Empathy may trigger helping behaviour when the risk of contagion is low or when the chance of reciprocity and kinship is

present, but disgust may still shape behaviour in a way that reduces exposure to infection (e.g., wearing gloves to avoid the bodily fluids of the sufferer). Disgust may lead one to avoid the sick, but empathy may shape the avoidance behaviour so that helping maintains a reduced risk of contagion (e.g., taking on the sick's duties, such as childcare). To further resolve how these conflicting emotions shape helping behaviours, Steinkopf (2017) argues that empathy researchers should consider disgust as an adaptive mechanism which modulates empathy and disgust researchers should consider empathy as an adaptive mechanism which modulates disgust.

Since researchers have traditionally regarded empathy and disgust in isolation, there are very few studies empirically testing the association between empathy, disgust, and perceptions of stigmatized groups, especially those with disabilities, together. Nonetheless, the limited body of research into the interplay of empathy and disgust provides preliminary evidence in support of the evolutionary argument that empathy and disgust do not operate in isolation from one another. For example, Chan and Septianto (2022) found that participants for whom disgust was made salient had lower empathy scores, were more disgust sensitive and volunteered less time to work without pay for a non-profit group. Their analysis showed that empathy mediated the relationship between disgust and willingness to volunteer one's time. The researchers then manipulated both disgust and empathy and found that empathy moderated the effect of disgust on monetary donations. Disgust reduced charitable giving only when empathy was not heightened. Making empathy more salient curbed lower charitable giving exhibited by individuals made to feel disgusted.

Only one study was found that investigated how empathy and disgust influence perceivers' reactions to a disability. Stone and Potton (2014) found that empathy and disgust sensitivity regulate emotional responses to disfigured faces. Facial disfigurements may be due to

disease, injury, or developmental disabilities (e.g., cleft palate, Kabuki Syndrome) and are classified as a disability (Americans with Disabilities Act, 1990). Attractive faces elicited less disgust than disfigured and unattractive faces, which elicited similar levels of disgust. Disfigured faces elicited greater curiosity and sorrow than attractive and unattractive faces. The researchers speculate that participants may have experienced high levels of empathy when viewing the disfigured faces, as indicated by their self-reported experience of higher sorrow than disgust. Additionally, participants may have reported lower levels of disgust due to social desirability.

To test this, Stone and Potton (2014) conducted a second experiment where participants viewed the same stimuli images of attractive, unattractive, and disfigured faces used in experiment one, and were instructed to return their completed surveys either directly to the experimenter (low anonymity) or drop their surveys in a box for weekly collection (high anonymity). Those in the low anonymity condition self-reported less disgust and more positive emotions towards disfigured faces. When anonymity was high, participants reported greater levels of disgust and lower levels of positive emotions in response to disfigured faces than in response to attractive and unattractive faces. The effect of empathy on emotional reactions towards disfigured faces was moderated by social desirability (e.g., perceived anonymity). Participants high in empathy self-reported more positive emotions when rating disfigured faces but only when anonymity was low. Lastly, disgust sensitivity moderated emotions experienced in response to disfigured faces but not attractive or unattractive faces. Disfigured faces evoked greater disgust and less positive emotions among participants who were more disgust sensitive. These results suggest that perceivers' reactions towards disfigured faces are moderated by individual differences in both empathy and disgust sensitivity. Moreover, individual differences

in disgust sensitivity not only influence the experience of disgust but also a range of other emotions, such as empathy.

No study jointly tests the effects of empathy and disgust on perceptions of and attitudes toward people with disabilities in the context of the disease-avoidance mechanism proposed by the BIS theory. The most relevant work comes from Pazhoohi et al. (2021, 2022), who applied BIS theory to separately examine the impact of empathy (2021) and disgust (2022) on the perceived attractiveness of an individual with a physical disability as rated by members of the opposite sex.

First, Pazhoohi and colleagues (2021) tested how empathy influences the attractiveness ratings of an opposite-sex target with and without a physical disability. Participants were presented with images of an opposite-sex target with and without a physical disability and they rated the general attractiveness of the target. Researchers manipulated the type of physical disability (e.g., amputated arm, amputated leg, amputated arm with prosthetic on, etc.) and visibility of the disability (e.g., the physical disability was either visible or cropped out of the image to create impression that the target does not have a disability). Women rated men with a physical disability as more attractive than men without a disability before and after controlling for social desirability. Social desirability was shown to moderate this effect such that women with greater tendencies to present themselves in a favourable way were more likely to rate men with disabilities more positively. Among men, physical disability did not seem to affect the physical attractiveness ratings of women with a physical disability, and social desirability did not affect men's ratings. Empathy was positively correlated with attractiveness ratings of individuals with physical disabilities in both women and men. However, social desirability influenced attractiveness ratings, particularly in women.

Using the same experimental design, Pazhoohi et al. (2022) explored whether individual differences in disgust sensitivity predicted the romantic relationship potential of an opposite-sex target with and without a physical disability. Once again, women rated men with a physical disability as more attractive romantic partners than men without a disability, although this time, women's answers were not influenced by social desirability. Contrary to their previous findings (Pazhoohi et al., 2021), in this experiment men rated women with a physical disability as less attractive romantic partners than women without a disability. This sex difference in attractiveness ratings may be due to women assuming men missing a limb were injured, possibly in a battle, leading women to perceive these men as being braver and/or more sensitive, which in turn may evoke a more caring attitude and increased attraction towards this group of men. Importantly, no association was found between disgust and ratings of attractiveness as a romantic partner for either men or women. Therefore, the results of this study do not support the theorized association of disgust and stigmatizing attitudes toward individuals with this physical disability.

In conclusion, empathy has emerged as a potential key factor in diminishing negative perceptions of individuals with disabilities. Understanding and sharing the feelings of others can foster compassion and reduce stigma, ultimately leading to more inclusive and supportive attitudes (e.g., Geçkil et al., 2017; Parchomiuk, 2019; Sharma et al., 2021; Shivers, 2019; Webb et al., 2016). However, empathy alone does not fully account for the variations in how individuals perceive disability, and the precise mechanism behind this phenomenon remains uncertain (e.g., Howell et al., 2014; Stone & Potton, 2014; Tu et al., 2019). Unfortunately, there is limited research examining the relationship between empathy and other emotions, such as disgust, in shaping perceptions of people with disabilities. To our awareness, only one study exists that jointly examines the relationship between empathy and disgust in perceivers' reactions

towards disability (Stone & Potton, 2014), whereas only two studies apply BIS theory to investigate the contribution of empathy (Pazhoohi et al., 2021) and disgust (Pazhoohi et al., 2022) on perceptions of a romantic partner with a disability. Studying the interaction between empathy and disgust when investigating perceptions of disability may support the development of more informed interventions that enhance empathy and acceptance of individuals with disabilities while ensuring these changes are sustained over time.

The Present Study

The primary objective of this study was to examine the role of the BIS (i.e., disgust) in the formation of initial perceptions of a woman who discloses ISC. This project also explores how empathy and the degree of disability disclosure (i.e., low disclosure vs high disclosure) affects these perceptions and intentions to befriend the woman.

First, we hypothesized that negative perceptions of women who disclose ISC are predicted by individual differences in perceiver BIS activation. More specifically, we proposed that individuals with greater BIS activation, as indicated by scores on measures of DS, DP, PI, and GA, will perceive women who use ISC more negatively (**Hypothesis 1a**). Previous research has shown that individual differences in these various components of disgust greatly affect perceptions of and attitudes towards various disabling conditions (e.g., Dawydiak et al., 2020; Papathanasiou & Stylianidis 2022; Smith et al., 2007). We also explored whether empathy and sympathy alter the relationship between BIS activation and the negative perceptions of a woman disclosing ISC (**Hypothesis 1b**). In the existing literature, empathy has been found to have a moderating effect on attitudes towards disability (e.g., Webb et al.,2016). However, very few studies (i.e., Stone & Potton, 2014) have empirically examined the relationship between empathy, disgust, and perceptions of individual with disabilities.

Next, we hypothesized that overall, women who use ISC will be perceived more negatively than similar women who do not use ISC (**Hypothesis 2**). Many studies suggest that bodily fluids, such as feces and urine, and body parts, such as the anus and genitals, are cues that most reliability elicit disgust (e.g., Croy et al., 2013; Curtis & Biran, 2001; Curtis et al., 2004; Haberkamp et al., 2017; Oaten et al., 2009; Rozin & Fallon, 1987; Rozin et al., 2000; Schaller, 2016; Tybur et al., 2013). However, research has failed to address whether particular bodily fluids, or sources of these bodily fluids, elicit higher or lower levels of disgust when compared to one another. Based on the assumption that feces presents a greater pathogenic risk than urine, we theorized that female targets using a colostomy bag will be perceived more negatively than women who use ISC, with the least negative perceptions being towards controls who do not have a medical condition (**Hypothesis 3**).

This is the first study exploring ISC-related stigma and how different levels of disability disclosure affect perceptions. We examined whether detailed disclosure about intermittent catheterization (a) reduces negative perceptions and (b) increases positive perceptions of women who ISC (**Hypothesis 4**). Currently, there are mixed findings pertaining to the timing and degree of disclosure that is most effective in curbing negative attitudes towards people with disabilities (e.g., s; Mimoun & Margalit, 2023; Shpigelman et al., 2019) High disclosure may provide the BIS with rational information to accurately appraise pathogenic threats. Alternatively, the automaticity of the BIS may potentially override this rational information (e.g., Duncan 2005) and influence negative perceptions of those with disabilities based on perceiving infection within disability.

Our final hypothesis is that individuals are less likely to want to pursue a friendship with a woman who discloses ISC as compared to women who do not disclose ISC (**Hypothesis 5a**).

We also explored whether differences in disability disclosure (low vs. high) influence the likelihood that individuals want to pursue a friendship with a woman disclosing ISC (**Hypothesis 5b**). There is a concerning lack of attention given to whether disability disclosure and the level of disclosure impact perceptions and the perceiver's experience of disclosure, especially in the context of friendship. Disclosers often anticipate and/or perceive stigma after sharing personal disability-related information (e.g., Blaser & Ladner, 2020; Eccles et al., 2018; Marshall et al., 2020; Melian & Meneses, 2022), yet past studies have not thoroughly investigated the factors involved in disclosure that may either contribute to or alleviate this perceived stigma.

Method

Participants

The study received ethical approval from Lakehead University's Research Ethics Board prior to recruitment (see Appendix A). In total 482 individuals were recruited to participate in a study titled "*Perceptions of New Friends*". Participants were recruited through Lakehead University's Psychology Department SONA System, and from the general university community at Lakehead University, the greater Thunder Bay community, Southern Ontario, and the online internet community (see Appendix B for sample recruitment material).

The final sample consisted of 439 participants. The age of participants ranged from 17 to 54 (M = 21.90, SD = 5.46), and 67.7% of participants identified as White/Caucasian. In terms of sex, 77.0% of the sample was assigned female at birth. Regarding education, 85.3% of participants were current university students. Participants were randomly assigned to the four experimental vignettes as follows: (a) 111 in the control condition; (b) 114 in the colostomy condition; (c) 111 in the ISC low disclosure condition; and (d) 103 in the ISC high disclosure condition.

Initial inclusion criteria for participation was 16 years of age and older for Lakehead University students and 18 years of age and older for community participants. Participants were excluded if they met any of the following criteria: (a) reported currently use, or having ever used ISC (n = 17); (b) reported currently use, or having ever used a colostomy bag (n = 12); (c) indicating that they did not read the experimental vignette (n = 6); or (d) responding incorrectly to more than two instructed response items suggesting attention or validity concerns (n = 33).

Materials

Experimental Vignettes. Rather than exposing participants to a video or images of a female target (in this study, named Olivia), text vignettes were constructed to explore whether cognitive cues or verbal information (i.e., interpreting written/verbal information) of pathogenic risk activate the BIS in the same manner that other sensory cues of contagion (i.e., visual images or videos) activate the BIS. Verbal information was examined as it is similar to situations where people self-disclose disabilities verbally or in writing to others (e.g., by text or email). As such, four text vignettes were created to explore whether the BIS contributes to negative perceptions of individuals with invisible disabilities (see Appendix C). The vignettes describe a hypothetical social interaction involving the participant's friend, Sam, introducing the participant to their female friend, Olivia. The participant's friend was named 'Sam', as this is a gender-neutral unisex name which enables everyone to identify with the vignette depending on their friendship preferences. The feminine name 'Olivia' was chosen for the female target because it has consistently ranked as one of the top five most popular female baby names in the past decade (Statistics Canada, n.d.). The setting of the vignette (Sam's house) and the social activity (watching a movie and hanging out) were selected because it reflects a realistic situation and activity that most people engage in.

The vignettes differ in terms of the explanation provided for Olivia's longer than expected absence when she leaves to go to the washroom. The four conditions include: a) the control condition involves Olivia reporting that she had made an important phone call; b) the colostomy condition involves Olivia disclosing use of a colostomy bag with no explanation of the medical device; c) the first ISC condition involves Olivia sharing she must ISC but provides no explanation of the ISC procedure (ISC + low disclosure); and d) the second ISC condition involves Olivia sharing she must ISC and explains the ISC procedure (ISC + high disclosure).

These four conditions were selected because they permit examination of perceptions across different levels of disclosure and medical procedures involving bodily fluids. For example, manipulating the degree of disclosure allowed us to examine whether providing more or less detail about ISC improves or worsens first impressions of Olivia. Based on the existing literature indicating that bodily fluids such as feces are perceived as being pathogenic and elicit high levels of disgust (e.g., Curtis & Biran, 2001; Tybur et al., 2013), comparing the colostomy condition to the ISC + low disclosure condition enabled us to test whether individuals engaging in medical procedures associated with different bodily fluids are perceived as equally disgusting, or if having a condition that requires higher contact with a certain bodily fluid results in more negative perceptions of the individual.

Measures

Demographics Questionnaire. This questionnaire was designed to collect basic demographic information relating to participants' age, sex, gender identity, ethnicity, highest level of education attained, parental education, and religion/spirituality (see Appendix D). Most of these items were developed and used within our lab in past studies. Also included was one sexual orientation question derived from the Kinsey Heterosexual-Homosexual Rating Scale

(Kinsey et al., 1948). The Kinsey Scale (Kinsey et al., 1948) asks participants to report their sexual orientation along a 6-point continuum, ranging from 0 (*Exclusively Heterosexual*) to 6 (*Exclusively Homosexual*), with bisexuality falling in the middle. The variables within the Demographics Questionnaire were used to examine group differences and as possible covariates.

Behavioural Immune System Measures. Three measures were used to examine trait reactivity of participants' Behavioural Immune Systems. The use of the following three measures provided us with the most detailed picture of how different BIS-relevant factors contributed to perceptions of women who ISC.

Perceived Vulnerability to Disease Scale (PVD). Developed by Duncan et al. (2009), the PVD questionnaire (see Appendix E) is a popular self-report tool used by researchers to assess subjective vulnerability to disease. This measure is made up of 15 items divided among two subscales: 1) germ aversion (PVD–GA); and 2) perceived infectibility/vulnerability (PVD–PV). The PVD–GA subscale features eight items measuring aversive reactions and discomfort in hypothetical contexts that connote a high risk of pathogen transmission. For example, "It really bothers me when people sneeze without covering their mouths". One new item (item 15) was created for the PVD–GA subscale to replace an original outdate item. The second subscale, PVD-PV uses seven items to examine subjective beliefs about one's immunological functioning and susceptibility to infectious diseases. A sample item from the PVD-PV subscale is "I have a history of susceptibility to infectious disease". Participants rate how much they agree with each statement using a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Seven of the 15 items are reverse-coded (items 2, 5, 12, 11, 13,14, 15). Higher scores reflect stronger beliefs about one's increased susceptibility to pathogenic infection. GA and PV

scores were explored as possible covariates for some analyses and used as predictor variables in other analyses in this study.

The scale demonstrates good overall internal consistency (Cronbach's α = .82; Duncan et al., 2009). The reliability of the subscales has also been established (Cronbach's α = .74 and .87 for GA and PV respectively). With respect to convergent validity, the PVD shows modest correlations with measures of hypochondriasis and contamination (i.e., *r* = .25 between PV and the Minnesota Multi Phasic Personality Inventory–2 Hypochondria scale; see Díaz et al., 2016). Given the modest correlations (*r* = .30; Duncan et al., 2009) reported between the two subscales, researchers recommend computing subscale scores for the two underlying factors along with an overall index of PVD. Exploratory factor analyses and relationships with other variables (e.g., disgust, gender, health beliefs) provide further evidence supporting the existence of two conceptually distinct factors, as outlined in reviews by Duncan et al. (2009) and Díaz et al. (2016). Findings from these studies reveal that aversive responses to perceived pathogenic sources tend to be predicted by either GA or PV, but not both. For example, GA is shown to predict implicit negative associations towards those possessing morphological deviations (e.g., immigrants; Schaller et al., 2003), whereas PV strongly predicts implicit negative associations towards those considered to have diminished immunocompetence (Duncan & Schaller, 2009). The proposed explanation for this is that GA measures intuitive, affect-based judgments about the risk of pathogen transmission while PV reflects more rational judgments about the risk of infection.

Disgust Propensity and Sensitivity Scale–Revised (DPSS–R). The DPSS–R (Fergus & Valentiner, 2009; see Appendix F) is a self-report questionnaire containing 12-items (Cronbach's α = .90; Olatunji et al., 2007) measuring two domains of disgust: 1) disgust propensity (DP); and

2) disgust sensitivity (DS). DP reflects one's general tendency to experience and respond with disgust in any given context (i.e., frequency). A sample item from the DP subscale is "Disgusting things make my stomach turn". DS is related to how distressing one finds the experience of disgust. A sample item from the DS subscale is "It scares me when I feel nauseous". All items are rated on a five-point Likert scale ranging from 1 (*never*) to 5 (*always*). Both the DP and DS subscales consist of 6 items and have good internal validity and reliability (Cronbach's α of .83 and .80 for the DP and DS subscales, respectively) and share a moderately strong relationship with one another ($r = .59$).

To our knowledge, the literature does not identify any clear cut-off scores that indicate high or low DS/DP. Instead, a range of scores is provided; the minimum score one can receive on either scale is 6 and the maximum score is 35. Moreover, there is great variability in how the measure is scored, with some studies computing an overall DPSS score (e.g., van Overveld et al., 2010) while other studies use subscale scores in their analyses (e.g., Paluszek et al., 2021). In this study, DS and DP scores were explored as possible covariates and used as outcome variables in analyses.

Similar to PVD, factor analyses (both confirmatory and exploratory) and relationships with other variables support a two-factor model of the subjective experience of disgust (Fergus & Valentiner, 2009; Olatunji et al., 2007; van Overveld et al., 2006). The DPSS–R is correlated with other established disgust indices, such as the Disgust Scale–Revised (DS–R; $r = .49$ between DP and DS–R, and $r = .40$ between DS and DS–R; van Overveld et al., 2011). Moreover, a copious amount of research implicates DS and DP in the development of various psychopathologies (e.g., OCD, anxiety; Olatunji et al., 2007; Olatunji & McKay, 2007; Olatunji, 2009; Rokvić, 2020).

Pathogen Disgust Subscale from the Three Domains of Disgust Scale (PD-TDDS). The TDDS (Tybur et al., 2009; see Appendix G) measures disgust sensitivity across three specific domains related to pathogens, sexuality, and morality. For the purpose of this study, only the seven-item pathogen disgust subscale (PD; Cronbach's α = .83; Tybur et al., 2009) was used. This enabled us to distinguish between "general" disgust sensitivity (DS in DPSS–R) and pathogen-specific disgust sensitivity, allowing for comparisons between DS and pathogen-specific disgust in predicting perceptions of women who ISC. Participants rate how disgusting each item is using a seven-point Likert scale ranging from 0 (*not disgusting at all*) to 6 (*extremely disgusting*). Higher scores reflect greater pathogen disgust sensitivity. A sample item from the PD subscale is "Accidentally touching a person's bloody cut". The PD–TDDS shows adequate levels of convergent validity with other related measures, such as the PVD (r = .26; Tybur et al., 2009). PD scores were explored as possible covariates and used as predictor variables in regressions.

Marlowe-Crowne Social Desirability Scale–Short Form (MC–C). The MC–C (Reynolds, 1982; see Appendix H) was included to assess participants' social desirability bias, or the tendency to portray oneself favourably according to social norms and expectations. The MC–C contains 13 true or false items measuring positive self-presentation (i.e., I'm always willing to admit it when I make a mistake). Items 5, 7, 9, 10, and 13 are scored as true, and items 1, 2, 3, 4, 6, 8, 11, and 12 are scored as false. Items that were answered "correctly" were scored as "0" and items that were answered incorrectly are scored as "1". An overall social desirability score was obtained by summing the scores for all items, with a maximum possible score of 13. Scores ranging from 0 to 3 reflect low levels of social desirability, scores ranging from 4 to 8 reflect average levels of social desirability, and scores ranging from 9 to 13 reflect high levels of social

desirability. For the purpose of this study, MC–C items were divided into two sets, with participants completing six items prior to exposure to the experimental vignette (items 1-6), and completing the remaining seven items (items 7-13) after exposure to the vignette.

The MC–C is a popular measure of social desirability and has been used across cultures (Kurz et al., 2016; Lavidas & Gialamas, 2019; Sârbescu et al., 2012; Vésteinsdóttir et al., 2017). The MC–C has demonstrated acceptable reliability, as indicated by Cronbach's α values ranging from .75 (Sârbescu et al., 2012) to .76 (Reynolds, 1982).

Since there is empirical evidence that individuals report positive explicit attitudes toward individuals with disabilities while maintaining negative implicit attitudes toward those with disabilities (i.e., Wilson & Scior, 2014, 2015), this scale was included to ensure that participants were responding truthfully and not simply endorsing responses believed to be most socially appropriate. Scores from the MCSD–S were used as an indicator of social desirability and used as a covariate.

Receptivity to New Friends Scale (RNFS). The RNFS (see Appendix I) consists of 76 items and was specifically designed for use in the present study to assess the multidimensional formation of perceptions of an unfamiliar female target (Olivia) living with or without a disability. Development of the RNFS was guided by the Multidimensional Attitudes Scale Toward Persons with Disabilities (MAS; Findler et al., 2007) which examines attitudes towards those with disabilities. The original MAS questionnaire consists of a vignette describing a social interaction between "Joseph" or "Michelle" and a man/woman in a wheelchair, and three subscales assessing (a) affective, (b) cognitive, and (c) behavioural attitudes towards the individual in the wheelchair.

Since the BIS is conceptualized as being made up of affective, cognitive, and behavioural components, the structure of the RNFS was adapted from the MAS. As such, the RNFS presented participants with a vignette describing a social interaction (see Appendix C) followed by three subscales examining (a) affective (19 items), (b) cognitive (24 items), and (c) behavioural (37 items) perceptions of Olivia. Each subscale is described in more detail below.

Affect subscale. The RNFS affect subscale contains 19 items examining affective reactivity to Olivia with 9 items for negative affect and 10 items for positive affect. Participants are asked to rate the extent to which they might experience each emotion during and after their first meeting with Olivia, as described by the vignette, using a 5-point Likert-type scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*).

Items used in the RNFS affect subscale were informed by the MAS (8 items), Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) (9 items), the Multiple Affect Adjective Check List–Revised (MAACL–R; Lubin et al., 1986) (2 items), or developed based on theoretical relevance (2 items).

Eight emotions (items 1, 2, 3, 4, 5, 6, 7, 12) mentioned in the RNFS were similar to those in the MAS. When creating the MAS affect subscale, Findler et al. (2007) based items on the circumplex model of affect (or schematic map of core affect; Russel 1980, Russel & Barrett, 1999) and Izard's theory of emotions (e.g., Izard, 1971). The 16-item MAS affect subscale demonstrates good overall reliability (Cronbach's $\alpha = .90$; Findler et al., 2007).

Nine emotions (items 3, 7, 8, 9, 10, 11, 13, 14, 17) used in the RNFS were used in the PANAS. The PANAS consists of 20 adjectives with 10 items for positive affect (PA) and 10 items for negative affect (NA; Watson et al., 1988). The coefficient alpha for the PA subscale is .89 and .87 for the NA subscale, demonstrating that the PANAS scales are highly internally

consistent (Watson et al., 1988). While the PANAS includes the emotion ‘strong’, we used ‘confident’ in the RNFS to avoid implying an ableist comparison. Two of the emotions (items 3, 7) appear in both the MAS and PANAS.

Two items (items 15, 16) were identical to two items in the Positive Affect subscale within the MAACL–R. The MAACL–R is a self-report tool developed to measure state and trait affective responses to a variety of situations (Lubin et al., 1986).

The final two items in the RNFS (items 18, 19) were adjectives added to examine the role of sympathy and empathy in forming affect-based perceptions of the female target.

Two RNFS-Affect scores were calculated: a) mean positive affect (items 4, 5, 9, 11, 13, 14, 15, 18, 19); and b) mean negative affect (items 1, 2, 3, 6, 7, 8, 10, 12, 17). Higher positive affect scores reflect experiencing relatively more positive affect in response to Olivia, and higher negative affect scores indicate relatively more negative affect.

Cognitions subscale. The RNFS cognitions subscale consists of 19 items examining cognitions in response to the vignette and Olivia. Nine items describe positive cognitions, and 10 items describe negative cognitions. Participants rate the likelihood that they may experience each of the thoughts during or after meeting Olivia using a 5-point Likert scale ranging from 1 (*extremely unlikely*) to 5 (*extremely likely*).

Items used in the RNFS cognition subscale were modelled after items from the MAS (7 items), the College Interaction Self-Statement Test (CISST; Fichten & Amsel, 1988) (5 items), the Social Interaction Self-Statement Test (SISST; Glass et al., 1982) (3 items), the Perceived Acceptance Scale (PAS; Brock et al., 1998) (1 item) and developed independently within the lab (3 items). At the recommendation of the authors of the original MAS, care was taken to ensure the RNFS subscale contained both positively and negatively valanced cognitions, as the original

MAS cognitive subscale only included positively phrased items (Findler et al., 2007). The RNFS cognitions subscale includes both self-referent items (e.g., I believe I would very much enjoy talking to Olivia again) and other-referent items (e.g., Olivia seems friendly).

Seven items (items 1, 2, 4, 6, 8, 12, 15) used in the RNFS were adapted from the MAS cognitions subscale, which demonstrates good overall reliability (Cronbach's $\alpha = .88$; Findler et al., 2007). Two positive statements used in the MAS and included in the RNFS (items 6, 12) were rephrased to be negative in the RNFS (items 1, 15). When creating the original MAS cognitions subscale, Findler et al. (2007) mainly drew items from the CISST, which measures college students' thoughts about interacting socially with individuals both with and without disabilities (Fichten & Amsel, 1988). The data provided by Fichten and Amsel (1988) report internal consistency coefficients for CISST subscales ranging from .54 to .87 and test-retest reliabilities between .28 and .89. Similar to the MAS, the CISST was used as a guide when generating items for the RNFS. Five items included in the RNFS (items 5, 7, 10, 13, 17) were adapted from the CISST.

Three items (items 3, 14, 19) were adapted from the SISST, a tool containing two subscales used to examine positive (SISST–P) and negative self-statements (SISST–N) concerning one-on-one social interactions with members of the opposite sex (Glass et al., 1982). The items were modified for use in this study to better reflect cognitions that might arise in social interactions with an individual with a disability.

One item (item 9) was adapted from the PAS (Brock et al., 1998). Broadly, the PAS examines thoughts related to self-acceptance and perceived acceptance from family and friends (Brock et al., 1998). Item wording was rephrased to relate to the context of interacting with the female target, Olivia (i.e., I am not comfortable with "just being myself" around Olivia).

Lastly, three items (items 11, 16, 18) were developed for the purpose of this study to examine cognitions about potential future social interactions with Olivia.

Two RNFS-Cognitions scores were calculated: a) mean positive cognitions (items 2, 4, 6, 8, 10, 12, 14, 16, 18); and b) mean negative cognitions (items 1, 3, 5, 7, 9, 11, 13, 15, 17, 19). Higher positive overall scores indicate relatively more positive cognitions in response to Olivia and higher negative overall scores indicate relatively more negative cognitions.

Behaviour subscale. The RNFS behavioural subscale consists of 37 items examining behavioural responses during and after the initial meeting with Olivia. Using a 5-point Likert scale ranging from 1 (*extremely unlikely*) to 5 (*extremely likely*), participants rate the likelihood that they might behave in a certain manner during and after their first meeting with Olivia. Of the 37 items, 18 assess behaviours arising during the first meeting with Olivia with 9 statements describing positive interactions and 9 statements describing negative interactions. The remaining 19 items assess future possible behavioural responses towards Olivia with 12 statements describing positive future interactions and 7 statements describing negative future interactions.

Four items (items 1, 2, 4, 5) examining behaviours during the first meeting with Olivia were similar to those used in the MAS behaviours subscale, which demonstrates good overall reliability (Cronbach's $\alpha = .83$).

The remainder and majority of items in the RNFS behaviours subscale were generated for the purpose of this project using the Activity Preference Scale (APS; Siperstein, 1980), also referred to as the Friendship Activity Scale, as a guide. The original APS questionnaire was developed by Siperstein (1980) for use with children and consists of 17 statements describing a variety of common activities that children may engage in with a particular target (i.e., friend, unfamiliar target child). Example items from the APS are "Go shopping at a store together" and

"Go to the movies together". Item modification involved substituting activities from the original questionnaire with activities more likely to be engaged in by adults in today's society (e.g., sending friend/follow requests via social media).

Scoring of the RNFS behavioural subscale can involve computing six means: a) mean positive during-behaviour items (items 3, 4, 6, 7, 10, 12, 13, 15, 17); b) mean positive after-behaviour items (items 2, 3, 5, 6, 8, 9, 11, 12, 14, 15, 17, 18); c) mean negative during-behaviour items (items 1, 2, 5, 8, 9, 11, 14, 16, 18); d) mean negative after-behaviour items (items 1, 4, 7, 10, 13, 16, 19); e) overall mean positive behaviours ; and f) overall mean negative behaviours. The mean of the two positive scores were summed to yield the overall mean positive behaviour score. The mean of the two negative scores were summed to yield the overall mean negative behaviour score. Higher positive overall behaviour scores reflect relatively more positive intended behaviours towards Olivia, whereas higher negative scores indicate relatively more negative behaviours.

First Impressions Valence Scale (FIV). A short three-item measure was developed for the purpose of this study to assess the degree to which first impressions of Olivia were positive and/or negative (see Appendix J). The first item asks participants to rate how positive or negative their first impression of Olivia is using a 7-point Likert scale ranging from 1 *(extremely negative*) to 7 (*extremely positive*). The second item asks participants to rate how positive of an impression they currently have of Olivia using a 7-point Likert scale ranging from 1 (*neutral*) to 7 (*extremely positive*). The third item asks participants to rate how negative of an impression they currently have of Olivia using a 7-point Likert scale ranging from 1 (*neutral*) to 7 (*extremely negative*). The first two items were reverse coded and then the three items were summed to create an overall first impressions score. Higher scores represented having a more negative first

impression of Olivia. While not used in this thesis, this overall first impressions score can be used to assess the construct validity of the RNFS.

Trait First Impressions Scale (TFI). The TFI scale was developed for this project to further explore first impressions of Olivia (see Appendix K). The Adjective Checklist created by Siperstein (1980) to measure children's attitudes towards and acceptance of peers with a disability was used as a guide in the development of the TFI. The TFI scale contains 40 adjectives, 20 positive trait descriptors (e.g., confident, honest, interesting) and 20 negative trait descriptors (e.g., boring, obnoxious, weird), listed in alphabetical order. Participants rate how much they agree that each trait describes an individual (e.g., Olivia) using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Three scores can be computed: a) mean of negative traits; b) mean of positive traits; and c) overall trait first impressions. The mean score of positive traits was subtracted from the mean score of negative traits to produce the overall trait first impression score, with higher scores indicating a more negative first impression of Olivia and lower scores indicating a more positive first impression of Olivia. This scale provides a more detailed and accurate picture of how participants perceive an individual. The overall trait first impressions scale was not used in final analyses but can be used to examine validity of the RNFS.

Level of Friendship Item. This item was created to explore the level of friendship participants would consider pursuing with Olivia following their first meeting (see Appendix L). Seven types of friendships are listed along a 7-point Likert scale, with 1 describing the most distant relationship (*stranger*) and 7 describing the closest relationship (*best friend*). Participants indicate which item on the scale best describes the type of friendship they would like to have with Olivia. Friendship categories were drawn from existing studies investigating friendship

development in children, adolescents, and adults (DePaulo & Kashy, 1998; Fischer, 1982; Hays, 1985; Lee, 2022; Mendelson & Kay, 2003; Newcomb & Bagwell, 1995; Rybak & McAndrew, 2006; Verbrugge, 1977). The mean score of this item can be used to explore validity of measures.

The Desire for Friendship Scale. Participants' interest in becoming friends with Olivia was assessed using six items. These items were inspired by those in Coyne (1976), Rubin (1970), and Vorauer and Sakomoto (2006), and were modified for use in this study (see Appendix L). Of the six items, three statements (items 1, 3, 5) described positive thoughts one may have about developing a friendship with Olivia (i.e., "I am interested in having a friendship with Olivia.") and three statements (items 2, 4, 6) described negative thoughts towards a future friendship with Olivia (i.e., "I don't think Olivia and I would be good friends."). All items were rated along a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), and items 2, 4, and 6 were reverse scored. Scores reflect a mean of all six items and the desire for friendship mean score was used as a dependent variable in a set of analyses (H5). Higher scores indicated more positive thoughts and intentions regarding future interaction and friendship with Olivia.

Physical Experience Item. Two categorical and one open-ended item asked participants to briefly describe their physical experience in response to the vignette and Olivia (see Appendix M). These exploratory questions were used to examine whether the BIS produced any reflexive physical effects (e.g., tightening of pelvic floor muscles) when processing potentially pathogenic cues. Responses were not used in the final thesis.

Empathy Measures. Empathy data was collected using two self-report instruments. Although numerous self-report instruments exist to measure empathy, the psychometric properties of these instrument have been heavily criticized (Carré et al., 2013; Harrison et al.,

2022; Vossen et al., 2015). Thus conceptual (i.e., item content and wording) and psychometric adequacy were considered when selecting the empathy measures used in this study. Empathy and sympathy were examined as variables and covariates given that they could influence perceptions of individuals with disabilities (Pazhoohi et al., 2021, 2022; Stone & Potton, 2014).

Empathy Components Questionnaire (ECQ). The ECQ (Batchelder et al., 2017; see Appendix N) was used to assess the cognitive and affective components of empathy. The 27-item ECQ consists of five subscales distinguishing between the ability to be empathic and the drive to engage in empathic behaviours: 1) cognitive ability (one's capacity or potential to take on the perspective of another and adopt their point of view); 2) cognitive drive (one's motivated interest or tendency in perspective-taking and adopting another's view); 3) affective ability (one's capacity or potential to recognize, be sensitive to, and share another's emotional experiences); 4) affective drive (one's motivated interest or tendency in recognizing, being sensitive to, and sharing another's emotional experiences); and 5) affective reactivity (appropriately reacting and responding to another's emotional experience). All items are rated using a four-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*), with half of the items being reverse-coded. Higher scores represent higher levels of empathy (see Appendix E for scoring details).

The five subscales have been empirically obtained through validity testing and factor analyses. The internal consistency of the ECQ scale as a whole has been empirically established, with alpha coefficients ranging from .83 (Batchelder et al., 2017) to .89 (Wright & Wright, 2021). In regard to the ECQ subscales, validation studies using British samples report alpha reliabilities ranging from .70 to .81, indicating good internal consistency (Batchelder et al.,

2017). The three-week test-retest reliability for the ECQ among a Chinese-speaking sample was good (r = .51 to .70; Ge et al., 2023). The ECQ was used as covariate in this project.

The Adolescent Measure of Empathy and Sympathy (AMES). The AMES (Vossen et al., 2015; see Appendix O) is made up of 12 items divided among three subscales: 1) affective empathy (one's ability to emotionally resonate with others and genuinely share in their emotional experiences); 2) cognitive empathy (the ability to mentally understand and comprehend the emotions, thoughts, and perspectives of other people); and 3) sympathy (understanding the emotions of others and feeling compassion for them without necessarily directly experiencing or sharing in their emotional states). The three subscales emerged empirically via validity testing and factor analyses (see Vossen et al., 2015). Participants respond to each item using a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*always*). Subscale are scored using the mean and higher scores indicate greater levels of affective empathy, cognitive empathy, and sympathy, respectively (see Appendix F for scoring details).

In original validation studies using adolescents, the AMES subscales were shown to have good internal consistency and reliability (Cronbach's α of .75, .86, and .76 for the affective empathy, cognitive empathy, and sympathy subscales, respectively; Vossen et al., 2015). When used with adults, the AMES subscales maintain acceptable levels of internal consistency (Cronbach's α of .80, .79, and .71 for the affective empathy, cognitive empathy, and sympathy subscales, respectively; Bloom & Lambie, 2020). The two-week test-retest reliabilities for AMES subscales were found to be good (r = .56 for affective empathy; r = .66 for cognitive empathy; and r = .69 for sympathy) and consistent with other empathy questionnaires (Vossen et al., 2015). Construct validity was evidenced through correlations with other theoretically relevant

empathy concepts and variables (i.e., prosocial behaviours; Vossen et al., 2015). For this study, only the sympathy subscale was used.

Disability Familiarity Items and Indexes. Nine items were developed to assess participants' familiarity with disability in general, and more specifically with colostomy and ISC (see Appendix P). Three *Yes-No* items asked whether participants were personally close to someone (e.g., friend, family member, classmate, co-worker) who has a disability, uses ISC, and/or has a colostomy. Two *Yes-No* items asked whether participants themselves used or ever had used ISC or a colostomy bag. Participants who indicated "yes" to either of these items were excluded from any analyses as described earlier. We also evaluated what the extent of participants' knowledge and familiarity with these conditions was prior to participating in the study using two items rated along a 4-point Likert scale ranging from 1 (*No familiarity or knowledge*) to 4 (*A great deal of familiarity or knowledge*). Lastly, two items examined whether they had received any formal education or training related to ISC or colostomy. Responses to these two items were scored using a 3-point scale: 0 (*no)*; 0.5 *(not sure)*; or 1 (*yes)*. Three scores were computed: a) disability index (sum of items 1, 2, and 3); b) colostomy index (sum of items 2, 4, 8, and 9); and c) ISC index (sum of items 3, 5, 6, and 7). These indices were used as covariates in analyses where relevant.

Infrequency. Participant attentiveness when completing the research questionnaire was assessed using eight "instructed response items" (IRI; see Appendix Q), where participants are directed to select a specific response option (e.g., "Please select 'True' for this item to assist the researchers of this study in data checking."; Gummer et al., 2021; Meade & Craig, 2012). It was anticipated that attentive participants would adhere to instructions and provide the "correct" instructed answer. Responses were scored as "1" when the instructed answer was given and "0"

if an incorrect response was selected. Researchers recommend using one IRI per 50-100 questionnaire items (Meade & Craig, 2012; Marjanovic et al., 2019). For the purpose of this study, eight IRI items were created. Items were embedded within the demographics questionnaire, the first set of MC–C items (Reynolds, 1982), the RNFS Cognitions subscale, the RNFS Behaviours After subscale, the Trait First Impressions Scale, Familiarity Items, the ECQ (Batchelder et al., 2017) and the AMES (Vossen et al., 2015). Unlike other infrequency measures, which can be interpreted in various ways – leading one participant to see an incorrect response as correct or vice versa – a key benefit of IRIs is that they minimize confusion (Kim et al., 2018). Additionally, IRIs are less susceptible to type II errors (Curran, 2016).

To be included in the final sample, participants had to correctly answer at least six of the eight items (75%). It is recommended that researchers err on the side of caution and use a 50% tolerance threshold on the IRI items, meaning that if participants provide incorrect answers to half or more of the IRIs, then they should be excluded from the data analysis (Curran, 2016). However, due to the transparent nature of IRIs, cut-off score decisions can be left to researcher's discretion, given that these decisions are made prior to data analysis (Curran, 2016). Estimates of inattentive responding when completing studies also vary widely, ranging from as low as 1% (Gough & Bradley, 1996) to as high as 30% (Burns et al., 2014). The inclusion of inattentive responders can bias statistical analyses, with this effect related to the proportion of inattentive responders included in the final sample (Huang et al., 2015). In considering these references, the length of the current study, and the fact that participants must read a vignette which varied in length between the four experimental conditions, we decided to use a more conservative cut-off threshold of 75%.

Procedure

The present study adopted a between-subjects experimental design (random assignment to one of four groups) with study questionnaires administered using an online format. Interested participants were directed to a secure link within SurveyMonkey to complete a study titled "*Perceptions of New Friends*". Participants were informed that the research goal of the study is to explore various factors shaping perceptions and first impressions of potential new friends.

Participants provided informed consent (see Appendix R for Information Letter and Consent Form). They then completed the questionnaire battery containing the measures described above (see Measures) and experimental vignettes, presented in the following order: 1) demographics questionnaire; 2) PVD (Duncan et al., 2019); 3) DPSS–R (Fergus & Valentiner, 2009); 4) PD–TDDS (Tybur et al., 2009); 5) the first set of MC–C (Reynolds, 1982) items; 6) the vignette introducing the female target, Olivia (random assignment to one of four conditions done by Survey Monkey); 7) Receptivity to New Friends Scale (affect, cognitions, behaviours during, behaviours after); 8) First Impressions Valence Scale; 9) Trait First Impressions Scale; 10) Level of Friendship Item; 11) Desire for Friendship Scale; 12) Physical Experience Items; 13) the ECQ (Batchelder et al., 2017); 14) the AMES (Vossen et al., 2015); 15) the second set of MC–C (Reynolds, 1982); and 16) Familiarity Items. IRI items were systematically distributed throughout the questionnaire (see Measures – Infrequency). As noted above, participants completed BIS measures (i.e., PVD, DPSS-R, and PD–TDDS) prior to reading their randomly assigned experimental vignette to obtain a baseline measure of BIS reactivity.

After completing the study, participants were directed to the debriefing form (Appendix S). The questionnaire took approximately 24 minutes to complete. Lakehead University students were given one bonus credit towards an eligible psychology course for their participation. All

participants were invited to enter a draw for the chance to win one of three $50 (CDN) electronic gift cards from GiftCards.ca.

Data Screening and Statistical Considerations

Statistical analyses were conducted using IBM SPSS Statistics (Version 29.0.2.0). Before conducting analyses, the data were checked for accuracy, outliers, normality, and homoscedasticity. The primary hypotheses were tested using a hierarchical linear regression, MANCOVAs, and ANCOVAs, with the significance threshold set at $p < .05$ for all analyses. A threshold of $p < .10$ was used to indicate nonsignificant trends. Multivariate significance was assessed using Pillai's trace criterion. Univariate ANCOVAs were performed as follow-up tests when MANCOVAs were significant. The Bonferroni correction was applied to follow-up comparisons to minimize the risk of Type I errors. Effect sizes (η^2) were classified as small if ranging from 0 to .01, medium at .06 and large at .14 (Cohen, 1988). Unless otherwise specified, all reported means are raw, untransformed, and unadjusted for covariates, with figures showing adjusted means alongside their standard errors.

Covariates were selected a priori based on their theoretical relevance (Streiner, 2016; Wang et al., 2017). The four covariates used in all analyses were germ aversion, empathy, sympathy, and social desirability. These covariates were selected as there is evidence that they can affect perceptions of people. There is research indicating that germ aversion has a role in shaping disease-relevant perceptions and amplifying the effects of associating heuristic disease cues with disease-relevant concepts (Duncan & Schaller, 2009; Park et al., 2007). Empathy has been shown to be a key factor in reducing negative perceptions of individuals with disabilities (i.e., Parchomiuk, 2019; Webb et al., 2016), and sympathy has been linked to the formation of negative attitudes towards those with disabilities (Bania et al., 2023). Social desirability was also

included as a covariate in all analyses because it has been shown to affect perceptions of and attitudes towards people with disabilities (i.e., Pazhoohi et al., 2021; Stone & Potton, 2014). To check on the appropriateness of the covariates and to guide interpretation of findings, correlations between these covariates and outcome variables were examined.

Depending on the hypothesis, disability index (H2 and H5a), ISC index (H3, H4 and H5b), and colostomy index (H3) were used as covariates. These indices measure participants' familiarity with, and knowledge of, disability and the medical procedures in question. Familiarity with disability and specific medical procedures may influence participants' responses and overall comfort with disability, ISC, and/or colostomy (Wang et al., 2021). Thus, controlling for group differences in these factors is necessary to ensure that any observed effects are not confounded by varying levels of knowledge or experience with disability and these medical procedures.

Results

Missing Data

An inspection for missing data was completed. A decision was made to impute only missing scale items and not missing variables. Across items and variables, the range of missingness was 0 – 2%. Mean imputation is recommended to replace missing data when less than 10% of the data is missing (Tabachnick et al., 2019; Tsikriktsis, 2005). As a result, mean imputation based on individual item scores was only applied for measures with ten items or more. Missing values (and the maximum number of items replaced) were imputed for items within the Receptivity to New Friends Affect subscale (1 item), Receptivity to New Friends Cognitions subscale (1 item), Receptivity to New Friends Behaviours subscale (2 items), Trait First Impressions scale (2 items), and the MC–C (1 item). No data were replaced when missing values exceeded 10% of the data. Those participants were excluded from the relevant analyses.

Assessing Statistical Assumptions

Prior to conducting analyses testing the primary hypotheses, the data were reviewed to ensure compliance with statistical assumptions. The primary outcome variables, which included the affective, cognitions, and behavioural Receptivity to New Friends Scale (RNFS) subscale scores measuring positive and negative perceptions, the level of friendship score, the Desire for Friendship Scale score, and the negative perceptions composite score were evaluated for outliers and normality. Outliers were identified by checking for z-scores greater than an absolute value of 3.29 (Tabachnick et al., 2019). The distribution of outcomes variables was assessed for normality across the groups used to test each hypothesis. Visual inspection of distributions as well as the following criteria was used to evaluate normality: skewness divided by its standard error <3, and kurtosis divided by its standard error <3 (Tabachnick et al., 2019).

Among the positive perceptions RNFS variables, outliers were detected within the cognitions score (n = 1) and the behaviours score (n = 1). Given that both distributions met normality criteria for skewness and kurtosis, analyses were conducted with and without outliers to check that they did not alter findings and to account for any meaningful variation they might represent. Analyses excluding outliers are reported here, as including them violated Box's Test for Equivalence of Covariance Matrices and the assumption of homogeneity. The positive affect RNFS variable met normality tests across all groups.

Among the negative perceptions RNFS variables, outliers were detected within the affect score (n = 4) and the behaviours score (n = 2). Both variables exceeded the skewness and kurtosis threshold of three, and appeared nonnormal upon visual inspection. Log and square root transformations were applied to adjust these distributions and reduce outlier impact, though one outlier remained in the negative behaviours score. Analyses were conducted with and without

this outlier. Although the outlier did not alter findings, analyses without are presented here. The negative cognitions RNFS variable met normality criteria across all groups.

The level of friendship score and the Desire for Friendship Scale score met normality criteria in the groups used to test the hypothesis involving these outcome variables and no outliers were detected.

The composite negative perceptions score had no univariate outliers but was positively skewed (value > 3), and a log transformation was applied to reduce nonnormality. One univariate outlier was detected in the ECQ Cumulative Empathy score, which was removed, and the distribution met normality criteria. The pathogen disgust variable was slightly negatively skewed but appeared normal upon visual inspection with no outliers. Given the evidence that women are more sensitive to pathogen disgust than men (Tybur et al., 2009; Tybur et al., 2011; & Olatunji et al., 2012) and that the sample of the current study was predominantly female (77%), the nonnormality in this variable may reflect actual variance. The remaining predictor variables (e.g., disgust propensity, disgust sensitivity, social desirability, and sympathy scores) met normality criteria and no univariate outliers were found. Three multivariate outliers were identified based on their standardized residual values exceeding an absolute value of three and were removed.

Levene's Test for Equality of Variances and Box's Test for Equivalence of Covariance Matrices were performed for all multivariate analyses. The assumption of homogeneity was met for all analyses.

Group Equivalency and Correlations

Group differences and correlations between covariates and outcome variables were examined. Thus, the groups associated with each hypothesis (H2, H5a: control vs. ISC low disclosure; H3: control vs. colostomy vs. ISC low disclosure; H4, H5b: ISC low disclosure vs.

ISC high disclosure) were examined for equivalency using ANOVAs, *t*-tests, and chi-square tests. This tested the randomization procedure. Covariates were selected a priori based on their theoretical relevance (Streiner, 2016; Wang et al., 2017).

Descriptive data and inferential statistics for the control and ISC low disclosure groups are presented in Tables 1 and 2. The two groups differed in baseline germ aversion scores [$F(1, 219) = 2.07$, $p = .028$] and the disability index [$F(1, 220) = 4.75$, $p = .030$], with the control group scoring higher in germ aversion whereas the ISC group reported having more exposure to individuals with disabilities (disability index). Correlations between these variables and the outcome variables were examined (see Table 3). Germ aversion was not significantly correlated with any outcome variable whereas disability index was significantly correlated with negative cognitions, negative behaviours, positive cognitions, and positive behaviours. There was also a trend towards a group difference for empathy scores [$F(1, 213) = 2.93$, $p = .088$], and the correlations between both empathy and sympathy with the outcome variables were significant (see Table 3).

Descriptive data for the control, colostomy, and ISC low disclosure groups are presented in Tables 4 and 5. The three groups showed a strong nonsignificant trend to differ on germ aversion scores [$F(2, 334) = 3.03$, $p = .050$]. Follow up *t*-tests revealed a non-significant trend for the control group to be higher in germ aversion than the ISC low disclosure group ($p = .079$). The correlations between germ aversion, ISC index, colostomy index, empathy, and sympathy, with outcome variables were also examined and are presented in Table 6.

Descriptive data for the ISC low disclosure and ISC high disclosure groups are presented in Tables 7 and 8. The groups differed in ISC index [$F(1, 212) = 8.75$, $p = .003$], empathy [$F(1, 209) = 4.18$, $p = .042$], and sympathy [$F(1, 211) = 8.54$, $p = .004$]. The ISC high disclosure group

Table 1

Examination of Group Equivalency Between Control and ISC Low Disclosure Groups (Hypotheses 2 and 5a): Means (SDs)

Variable	Control Group (n = 105-111[a])	ISC Low Disclosure Group (n = 107-111[a])
Age (years)	22.30 (6.16)	22.06 (5.36)
Religion Index	2.26 (1.21)	2.20 (1.23)
Desire for New Friends	3.38 (1.09)	3.39 (0.99)
Attraction to Women	4.17 (3.34)	4.50 (3.37)
Social Desirability	5.83 (2.92)	5.50 (2.98)
Disability Index*	0.81 (0.63)	0.94 (0.59)
ISC Index	0.38 (0.61)	0.42 (0.55)
Colostomy Index	0.60 (0.70)	0.62 (0.71)
Germ Aversion - PVD*	4.44 (1.12)	4.12 (0.96)
Perceived Infectibility - PVD	3.83 (1.13)	3.80 (1.04)
Disgust Sensitivity - DPSS	15.13 (5.30)	14.72 (4.60)
Disgust Propensity - DPSS	18.33 (4.13)	18.00 (3.80)
Pathogen Disgust - TDDS	3.89 (1.13)	3.68 (1.10)
Sympathy - AMES	4.21 (0.57)	4.16 (0.59)
Cumulative Empathy - ECQ[t]	15.27 (1.50)	15.34 (1.75)

Note. [a] Sample size differed based on the variable. ISC = Intermittent Self-Catheterization; PVD = Perceived Vulnerability to Disease Scale; DPSS = Disgust Propensity and Sensitivity Scale; TDDS = Three Domains of Disgust Scale; ECQ = Empathy Components Questionnaire; AMES = The Adolescent Measure of Empathy and Sympathy. Significance was tested with *t*-tests. [t] $p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. ([t] = trend).

Table 2

Examination of Group Equivalency Between Control and ISC Low Disclosure Groups (Hypotheses 2 and 5a): Frequencies (%)

Variable	Control (n = 105-111[a])	ISC Low Disclosure (n = 107-111[a])
Biological Sex		
Male	24 (21.6)	30 (27.0)
Female	87 (78.4)	81 (73.0)
Gender		
Man	24 (21.6)	31 (27.9)
Woman	82 (73.9)	78 (70.3)
Neither	5 (4.5)	2 (1.8)
Ethnicity		
Caucasian	67 (62.6)	78 (71.6)
Non-Caucasian	40 (37.4)	31 (28.4)
Highest Education Participant		
High school Graduate	95 (85.6)	93 (83.8)
Post-Secondary School Graduate	16 (14.4)	18 (16.2)
Highest Education Paternal		
High school Graduate or Less	30 (28.3)	40 (37.4)
Post-Secondary School Graduate	76 (71.7)	67 (62.6)
Highest Education Maternal		
High school Graduate or Less	34 (30.6)	30 (27.0)
Post-Secondary School Graduate	77 (69.4)	81 (73.0)

Note. [a] Sample size differed based on the variable. ISC = Intermittent Self-Catheterization. Significance was tested with chi-square tests.

[t] $p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. ([t] = trend).

Table 3

Simple Correlations Between Outcome Variables and Covariates for a Sample Including Control and ISC Low Disclosure Groups (Hypotheses 2 and 5a): Bivariate Pearson Correlations

	Covariates				
Outcome Variable	Social Desirability (n = 221)	Germ Aversion (n = 221)	Disability Index (n = 222)	Empathy (n = 215)	Sympathy (n = 221)
Perceptions					
Negative Affect	-.07	.09	.00	-.19**	.03
Negative Cognitions	-.17*	-.05	-.20**	-.44***	-.25***
Negative Behavioural	-.11	.02	-.16*	-.48***	-.31***
Positive Affect	.12	-.01	.00	.24***	.20**
Positive Cognitions	.05	.02	.19**	.36***	.32***
Positive Behavioural	.02	-.12	.18**	.45***	.26***
Friendship Intentions					
Level of Friendship	-.00	-.08	.05	.19**	.12
Desire for Friendship	.03	-.16*	.14*	.34***	.23***

Note. Outcome variables above the dotted line pertain to hypothesis 2, and outcome variables below the dotted line pertain to hypothesis 5a. ISC = Intermittent Self-Catheterization

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

Table 4

Examination of Group Equivalency Between Control, Colostomy, and ISC Low Disclosure Groups (Hypothesis 3): Means (SDs)

Variable	Control (n = 105-111)	Colostomy (n = 110-114)	ISC Low Disclosure (n = 107-111)
Age (years)	22.30 (6.16)	21.25 (4.00)	22.06 (5.36)
Religion Index	2.26 (1.21)	2.20 (1.18)	2.20 (1.23)
Desire for New Friends	3.38 (1.09)	3.61 (0.90)	3.39 (0.99)
Attraction to Women	4.17 (3.34)	4.26 (3.27)	4.50 (3.37)
Social Desirability	5.83 (2.92)	5.59 (2.67)	5.50 (2.98)
Disability Index	0.81 (0.63)	0.89 (0.61)	0.94 (0.59)
ISC Index	0.38 (0.61)	0.46 (0.63)	0.42 (0.55)
Colostomy Index	0.60 (0.70)	0.74 (0.79)	0.62 (0.71)
Germ Aversion – PVD^{t}	4.44 (1.12)^{a}	4.16 (1.02)	4.12 (0.96)^{a}
Perceived Infectibility - PVD	3.83 (1.13)	3.90 (1.29)	3.80 (1.04)
Disgust Sensitivity - DPSS	15.13 (5.30)	15.25 (4.65)	14.72 (4.60)
Disgust Propensity - DPSS	18.33 (4.13)	18.35 (3.80)	18.00 (3.80)
Pathogen Disgust - TDDS	3.89 (1.13)	3.79 (0.92)	3.68 (1.10)
Sympathy - AMES	4.21 (0.57)	4.27 (0.52)	4.16 (0.59)
Cumulative Empathy - ECQ	15.27 (1.50)	15.46 (1.49)	15.34 (1.75)

Note. [a] Group differences between the indicated group and the other two groups. ISC = Intermittent Self-Catheterization; PVD = Perceived Vulnerability to Disease Scale; DPSS = Disgust Propensity and Sensitivity Scale; TDDS = Three Domains of Disgust Scale; ECQ = Empathy Components Questionnaire; AMES = The Adolescent Measure of Empathy and Sympathy. Significance was tested with ANOVAs.

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

Table 5

Examination of Group Equivalency Between Control, Colostomy, and ISC Low Disclosure Groups (Hypotheses 3): Frequencies (%)

Variable	Control (n = 105-111)	Colostomy (n = 110-114)	ISC Low Disclosure (n = 107-111)
Biological Sex			
Male	24 (21.6)	24 (21.1)	30 (27.0)
Female	87 (78.4)	90 (78.9)	81 (73.0)
Gender			
Man	24 (21.6)	25 (22.1)	31 (27.9)
Woman	82 (73.9)	86 (76.1)	78 (70.3)
Neither	5 (4.5)	2 (1.8)	2 (1.8)
Ethnicity			
Caucasian	67 (62.6)	77 (69.4)	78 (71.6)
Non-Caucasian	40 (37.4)	34 (30.6)	31 (28.4)
Highest Education Participant			
High school Graduate	95 (85.6)	96 (84.2)	93 (83.8)
Post-Secondary School Graduate	16 (14.4)	18 (15.8)	18 (16.2)
Highest Education Paternal			
High school Graduate or Less	30 (28.3)	31 (27.9)	40 (37.4)
Post-Secondary School Graduate	76 (71.7)	80 (72.1)	67 (62.6)
Highest Education Maternal			
High school Graduate or Less	34 (30.6)	30 (26.8)	30 (27.0)
Post-Secondary School Graduate	77 (69.4)	82 (73.2)	81 (73.0)

Note. ISC = Intermittent Self-Catheterization. Significance was testing with chi-square tests. $^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

Table 6

Simple Correlations Between Outcome Variables and Covariates for A Sample Including Control, Colostomy, and ISC Low Disclosure Groups (Hypothesis 3): Bivariate Pearson Correlations

	Covariates					
Outcome Variable	Social Desirability (n = 335)	Germ Aversion (n = 335)	ISC Index (n = 336)	Colostomy Index (n = 336)	Empathy (n = 325)	Sympathy (n = 334)
Perceptions						
Negative Affect	-.12*	.09	-.05	-.00	-.22***	-.03
Negative Cognitions	-.18***	.01	-.09	-.10	-.44***	-.28***
Negative Behaviours	-.13*	.07	-.11*	-.02	-.52***	-.35***
Positive Affect	.12*	-.02	.11*	.17**	.26***	.24***
Positive Cognitions	.04	.00	.04	.02	.37***	.35***
Positive Behaviours	.03	-.14**	.14**	.10	.47***	.30***

Note. ISC = Intermittent Self-Catheterization.

$^{t}p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. (^{t} = trend).

Table 7

Examination of Group Equivalency Between ISC Low Disclosure and ISC High Disclosure Groups (Hypotheses 4 and 5b): Means (SDs)

Variable	ISC Low Disclosure (n = 107-111[a])	ISC High Disclosure (n = 98-103[a])
Age (years)	22.06 (5.36)	22.25 (6.57)
Religion Index	2.20 (1.23)	2.06 (1.14)
Desire for New Friends	3.39 (0.99)	3.33 (1.02)
Attraction to Women	4.50 (3.37)	4.59 (3.28)
Social Desirability	5.50 (2.98)	5.03 (2.93)
Disability Index	0.94 (0.59)	0.87 (0.57)
ISC Index**	0.42 (0.55)	0.56 (0.66)
Colostomy Index	0.62 (0.71)	0.67 (0.72)
Germ Aversion - PVD[t]	4.12 (0.96)	4.35 (0.99)
Perceived Infectibility - PVD	3.80 (1.04)	3.91 (1.14)
Disgust Sensitivity - DPSS	14.72 (4.60)	14.63 (5.02)
Disgust Propensity - DPSS	18.00 (3.80)	18.05 (3.72)
Pathogen Disgust - TDDS	3.68 (1.10)	3.85 (1.10)
Sympathy - AMES**	4.16 (0.59)	4.25 (0.49)
Cumulative Empathy - ECQ*	15.34 (1.75)	15.46 (1.40)

Note. [a] Sample size differed based on the variable. ISC = Intermittent Self-Catheterization; PVD = Perceived Vulnerability to Disease Scale; DPSS = Disgust Propensity and Sensitivity Scale; TDDS = Three Domains of Disgust Scale; ECQ = Empathy Components Questionnaire; AMES = The Adolescent Measure of Empathy and Sympathy. Significance was tested with *t*-tests. [t] $p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. ([t] = trend).

Table 8

Examination of Group Equivalency Between ISC Low Disclosure and ISC High Disclosure Groups (Hypotheses 4 and 5b): Frequencies (%)

Variable	ISC Low Disclosure (n = 107-111)	ISC High Disclosure (n = 98-103)
Biological Sex		
Male	30 (27.0)	25 (24.3)
Female	81 (73.0)	78 (75.7)
Gender		
Man	31 (27.9)	25 (24.3)
Woman	78 (70.3)	73 (70.9)
Neither	2 (1.8)	5 (4.9)
Ethnicity		
Caucasian	78 (71.6)	79 (78.2)
Non-Caucasian	31 (28.4)	22 (21.8)
Highest Education Participant		
High school Graduate	93 (83.8)	93 (90.3)
Post-Secondary School Graduate	18 (16.2)	10 (9.7)
Highest Education Paternal		
High school Graduate or Less	40 (37.4)	42 (42.4)
Post-Secondary School Graduate	67 (62.6)	57 (57.6)
Highest Education Maternal		
High school Graduate or Less	30 (27.0)	32 (32.3)
Post-Secondary School Graduate	81 (73.0)	67 (67.7)

Note. ISC = Intermittent Self-Catheterization. Significance was testing with chi-square tests.

$^{t}p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$. (^{t} = trend).

was more familiar with ISC (ISC index) than the low disclosure group. The ISC high disclosure group also scored higher on measures of empathy and sympathy than the low disclosure group. A non-significant trend for the ISC high disclosure group to be higher in germ aversion than the ISC low disclosure group was detected [$F(1, 211) = 0.20$, $p = .089$]. Correlations between these variables and the outcome variables were examined (see Table 9). The correlations between both empathy and sympathy with the outcome variables were significant, however ISC index was not correlated with any outcome variable.

Main Analyses

Hypothesis 1: (a) Individuals with greater BIS activation, as indicated by scores on measures of DS, DP, PI, GA, and PD will perceive women who disclose ISC more negatively/less positively. (b) We will explore whether empathy and sympathy alter the relationship between BIS activation and the negative perceptions of the woman disclosing ISC.

A hierarchical linear regression was used to test this hypothesis. The outcome/predicted variable was negative perceptions composite scores, which were computed using the mean of the z scores for each of the affective, cognitive, and behavioural RNFS subscales measuring negative perceptions. Bivariate correlations between measures of BIS activation (i.e., germ aversion, perceived infectibility, disgust propensity, disgust sensitivity, pathogen disgust) and the outcome variable were examined to identify relevant BIS measures to include as predictors in the model. The bivariate correlations are shown in Table 10, with disgust propensity ($p = .024$), disgust sensitivity ($p = .019$), and pathogen disgust ($p = .038$) included as predictors due to their significant positive correlations with the outcome variable.

Social desirability and vignette exposure were included as covariates. Vignette exposure was included as a covariate to account for the two different conditions (ISC low disclosure vs.

Table 9

Simple Correlations Between Outcome Variables and Covariates for A Sample Including ISC Low Disclosure and ISC High Disclosure Groups (Hypotheses 4 and 5b): Bivariate Pearson Correlations

	Covariates				
Outcome Variable	Social Desirability (n = 214)	Germ Aversion (n = 213)	ISC Index (n = 214)	Empathy (n = 211)	Sympathy (n = 213)
Perceptions					
Negative Affect	-.12	.17*	-.05	-.15*	.01
Negative Cognitions	-.18**	.04	-.02	-.42***	-.26***
Negative Behaviours	-.05	.03	.02	-.47***	-.38***
Positive Affect	.12	.02	.06	.32***	.28***
Positive Cognitions	-.01	.01	-.06	.48***	.40***
Positive Behaviours	.06	-.11	.04	.46***	.31***
Friendship Intentions					
Level of Friendship	.03	.01	-.06	.29***	.22**
Desire for Friendship	.03	-.08	-.12	.41***	.24***

Note. Outcome variables above the dotted line pertain to hypothesis 4, and outcome variables below the dotted line pertain to hypothesis 5b. ISC = Intermittent Self-Catheterization.
$^{t}p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. (^{t} = trend).

Table 10

Hypothesis 1: Simple Correlations Between the Negative Perceptions Composite Score and Variables Reflecting Behavioural Immune System (BIS) Activation: Bivariate Pearson Correlations

Measures of BIS Activation	Negative Perceptions Composite Score (n = 213-214)
Germ Aversion	.10
Perceived Infectibility	.05
Disgust Propensity	.16*
Disgust Sensitivity	.16*
Pathogen Disgust	.14*

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

ISC high disclosure), mitigating potential variation in participant responses due to differences in the specific information each condition presented. Bivariate Pearson correlations for all variables used in both models are shown in Table 11.

Results for the first regression are presented in Table 12. Variables were entered in two blocks: a) block 1 included the two covariates; and b) block 2 included the three relevant BIS activation measures. In step one, social desirability and vignette exposure showed a nonsignificant trend to predict negative perceptions of the female using ISC [$F(2, 209) = 2.81$, $p = .062$]. In step two, the addition of measures of the BIS activation measures (i.e., disgust propensity, disgust sensitivity, and pathogen disgust) did not lead to a significant change in negative perceptions of the female using ISC [R^2 change = .021, $F(3, 206) = 1.49$, $p = .219$]. Adding the measures of BIS activation did not predict negative perceptions over and above social desirability and vignette exposure. Further, none of the variables were unique predictors, and there was only a nonsignificant trend for social desirability to be a unique predictor ($\beta = -.13$, $p = .065$, $sr^2 = -.13$). Overall, the model with all predictors in it was not significant, although there was a nonsignificant trend [$R^2 = .047$, $F(5, 211) = 2.02$, $p = .077$]. Thus, BIS activation did not predict negative perceptions of a female using ISC.

Results for the second regression are detailed in Table 13. For the second regression we examined whether empathy and sympathy predicted negative perceptions, and whether BIS activation could add to the prediction of negative perceptions beyond any variance accounted for by empathy and sympathy. Variables were entered in three blocks: a) block 1 included covariates; b) block 2 included empathy and sympathy; and c) block three included relevant BIS activation measures. The first step of the regression included social desirability and vignette

Table 11

Hypothesis 1: Simple Pearson Correlations Between the Negative Perceptions Composite Score and Variables Related to Behavioural Immune System (BIS) Activation, Empathy, and Sympathy

Predictors	Negative Perceptions Composite Score
	(*n* = 212)
Social Desirability	-.16**
Vignette	.03
Disgust Propensity	.14*
Disgust Sensitivity	.15*
Pathogen Disgust	.14*
	(*n* = 206)
Empathy	-.53***
Sympathy	-.30***

Note. Variables used in the first regression are above the dotted line. Variables used in the second regression are below the dotted line.

$^{t}p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. (^{t} = trend)\

Table 12

Hypothesis 1: Hierarchical Regression Examining the Extent to Which Variables Related to Behavioural Immune System (BIS) Activation Predict Negative Perceptions of Women who use ISC (Negative Perceptions Composite Score)

	Negative Perceptions Composite Score									
		Step 1		Step 2						
Predictors	ΔR^2	β	sr^2	β	sr^2	R^2	$R^2_{Adjusted}$	*F Change*	*F*	*N*
Step 1	.03^t					.03	.03		2.81^t	209
Social Desirability		-.16*	-.16*	-.13^t	-.13^t					
Vignette		.02	.02	.02	.02					
Step 2	.02					.05	.02	1.49	2.02^t	206
Disgust Propensity				.01	.01					
Disgust Sensitivity				.09	.07					
Pathogen Disgust				.07	.06					

Note. Dotted lines are used in the table to separate the variables entered together as blocks within the different steps of the regression model. ISC = Intermittent Self-Catheterization.

$^t p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. (^{t} = trend).

Table 13

Hypothesis 1: Hierarchical Regression Examining Predictors of Perceptions of Women who use ISC (Negative Perceptions Composite Score): Behavioural Immune System (BIS) Activation, Empathy, and Sympathy

	Negative Perceptions Composite Score											
		Step 1		Step 2		Step 3						
Predictors	ΔR^2	β	sr^2	β	sr^2	β	sr^2	R^2	$R^2_{Adjusted}$	*F Change*	*F*	*N*
Step 1	.03*							.03	.02		3.39*	203
Social Desirability		-.18**	-.18**	-.14*	-.16*	-.11^t	-.12^t					
Vignette		.01	.01	.01	.01	.01	.02					
Step 2	.27***							.30	.29	38.14***	21.39***	201
Empathy				-.53***	-.45***	-.52***	-.45***					
Sympathy				.02	.02	-.02	-.02					
Step 3	.03*							.33	.31	3.19*	13.99***	198
Disgust Propensity						.03	.02					
Disgust Sensitivity						.16*	.15*					
Pathogen Disgust						.02	.02					

Note. Dotted lines are used in the table to separate the variables entered together as blocks within the different steps of the regression model. The cumulative empathy score from the Empathy Components Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy were used. ISC = Intermittent Self-Catheterization.

$^t p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. (^{t} = trend)

exposure as covariates. This model significantly predicted negative perceptions [$F(2, 203) = 3.39$, $p = .036$]. Social desirability was a significant unique predictor in this model (β = -.18, $p = .010$, $sr^2 = -.18$). Empathy and sympathy were entered on the second step. These two variables added significantly to the prediction of negative perceptions [R^2 change = .266, $F(2, 201) = 38.14$, $p < .001$]. In this model, social desirability remained as a significant unique predictor (β = -.14, $p = .022$, $sr^2 = -.16$), and empathy emerged as a robust significant unique predictor (β = -.53, $p < .001$, $sr^2 = -.45$). The overall model explained 29% ($R^2_{Adjusted}$) of the variance and was significant [$R^2 = .299$, $F(4, 201) = 21.39$, $p < .001$]. The third step added measures of BIS activation (i.e., disgust propensity, disgust sensitivity, and pathogen disgust). These three variables added significantly to the prediction of negative perceptions [R^2 change = .032, $F(3, 198) = 3.19$, $p = .025$]. In the overall model, empathy remained as a strong unique predictor (β = -.52, $p < .001$, $sr^2 = -.45$), disgust sensitivity emerged as another significant unique predictor (β = .16, $p = .037$, $sr^2 = .15$), and social desirability was reduced to a trend (β = -.11, $p = .080$, $sr^2 = -.12$). The overall model with the seven predictors significantly explained 31% ($R^2_{Adjusted}$) of the variance and was significant [$R^2 = .331$, $F(7, 198) = 13.99$, $p < .001$]. Thus, empathy, BIS activation, and the covariates significantly predicted negative perceptions of a female using ISC and explained 31% of the variance in negative perceptions. It is noteworthy that the covariates and empathy explained 29% of the variance, while BIS activation added an additional 3%.

Hypothesis 2: Women who disclose ISC will be perceived more negatively/less positively than similar women who do not disclose ISC.

Two separate 2-group (control vs. ISC low disclosure) MANCOVAs were conducted, one for *positive* perceptions and one for *negative* perceptions. For each MANCOVA, the two

groups were compared on three DVs from the Receptivity to New Friends Scale (i.e., affective, cognitive, and overall behavioural subscale scores).

Positive Perceptions MANCOVA. The unadjusted means and *SD*s of the three DVs (positive affect, positive cognitions, and positive overall behaviours) are presented in Table 14. Visual examination of means for positive affect, positive cognitions, and positive overall behaviours indicated that the women disclosing ISC was rated more positively than the control women.

There was a significant overall multivariate group effect with a medium–large effect size, $F(3, 203) = 6.34$, $p < .001$, $\eta^2 = .086$, suggesting the groups differed in terms of positive perceptions. That is, women who reported using ISC were perceived more positively overall than control women who did not report using ISC. Follow-up univariate ANCOVAs (see Table 14) indicated that in comparison to participants rating the control woman, participants rating the ISC low disclosure woman reported having significantly more: (a) positive cognitions about her, with a medium effect size ($p < .001$, $\eta^2 = .071$); and (b) positive emotions towards her, with a small-medium effect size ($p = .004$, $\eta^2 = .039$). Further, a non-significant trend emerged in the same direction for intended positive behaviours towards the targets ($p = 0.073$, $\eta^2 = .016$). Thus, participants evaluating the female target who engages in ISC reported more positive emotions and thoughts about her, as compared to participants evaluating the control female target. Figure 1 illustrates these findings.

Negative Perceptions MANCOVA. The unadjusted means and *SD*s of the three DVs (negative affect, negative cognitions, and negative behaviours) as well as univariate ANCOVA results are presented in Table 14. Visual examination of means for negative affect, negative cognitions, and

Table 14

Hypothesis 2: Unadjusted Means (SDs) and Univariate ANCOVA Results Comparing Control and ISC Low Disclosure Groups on the Three Subscales of the Receptivity to New Friends Scale for Both Negative and Positive Perceptions

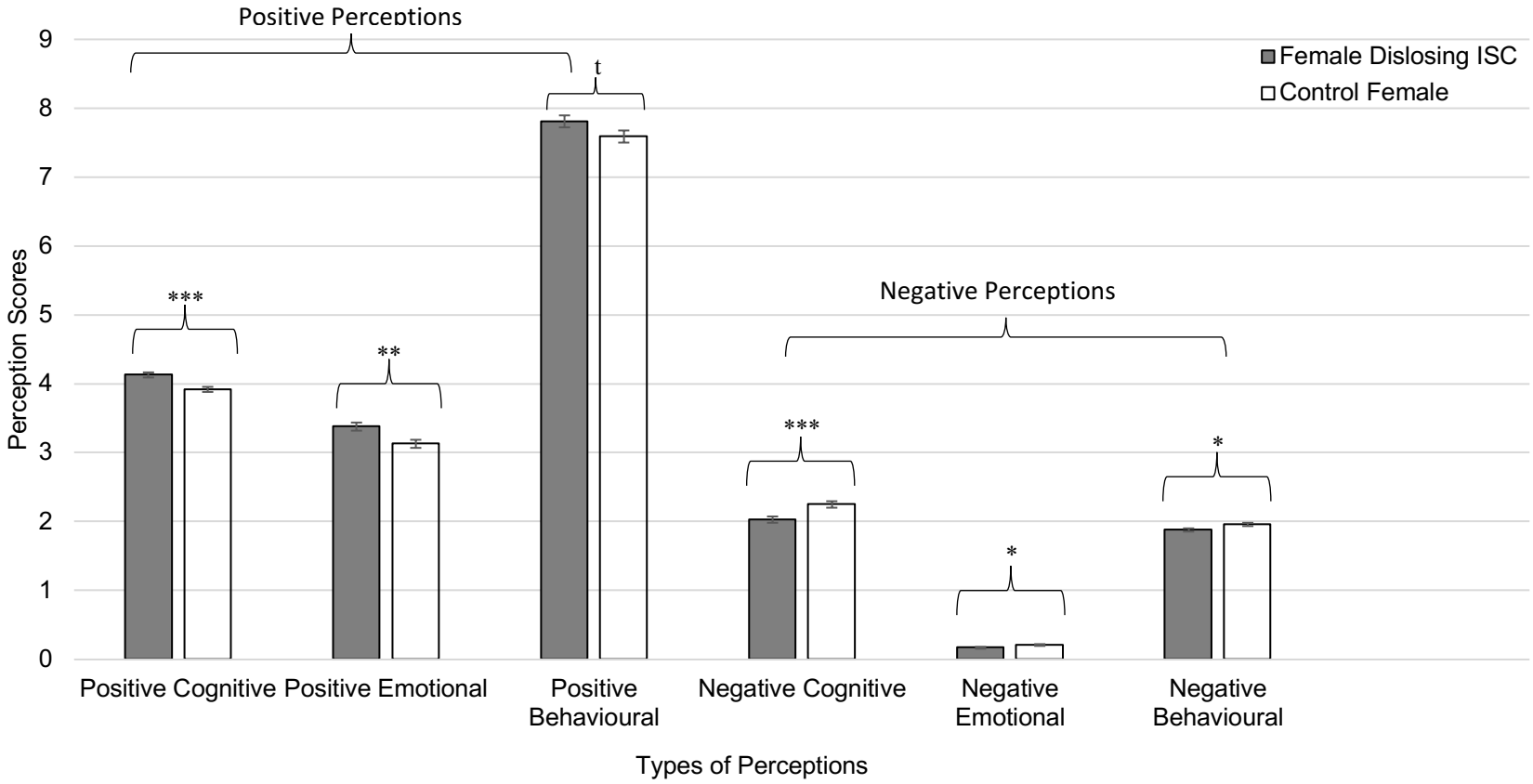
Perceptions Subscale	Control Group	ISC Low Disclosure Group	*df*	*F*	*p*	η^2
Positive	(*n* = 105)	(*n* = 107)				
Affect**	3.14 (0.61)	3.37 (0.63)	1, 205	8.39	.004	.039
Cognitions***	3.92 (0.35)	4.13 (0.45)	1, 205	15.71	< .001	.071
Behaviours[t]	7.54 (0.97)	7.86 (1.00)	1, 205	3.25	.073	.016
Negative	(*n* = 104)	(*n* = 109)				
Affect*	0.21 (0.14)	0.17 (0.13)	1, 206	4.13	.043	.020
Cognitions**	2.25 (0.50)	2.03 (0.57)	1, 206	11.05	.001	.051
Behaviours*	1.97 (0.24)	1.88 (0.30)	1, 206	5.50	.020	.026

Note. Variables pertaining to the positive perceptions MANCOVA are shown above the dotted line. Higher scores indicate more positive perceptions. Variables below the dotted line pertain to the negative perceptions MANCOVA. Higher scores indicate more negative perceptions. While the means presented here are not adjusted, the statistical analyses represented here are adjusted for the following covariates: disability index scores, social desirability scores, Germ Aversion–Perceived Vulnerability to Disease mean scores, cumulative empathy scores from the Empathy Components Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy. ISC = Intermittent Self-Catheterization.

[t] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$. ([t] = trend).

Figure 1

Positive and Negative Perceptions of a Female Disclosing ISC Versus a Control Female: Cognitive, Emotional, and Behavioural Subscales of the Receptivity to New Friends Scale (Hypothesis 2)



Note: For positive perceptions, there was a significant overall multivariate group effect with a medium–large effect size, $F(3, 203) = 6.34$, $p < .001$, $\eta^2 = .086$. For negative perceptions, there was a significant overall multivariate group effect with a medium effect size

across the three variables, $F(3, 204) = 3.78$, $p = .011$, $\eta^2 = .053$. Error bars represent standard errors of the mean. Means are untransformed and adjusted for the following covariates: disability index scores, social desirability scores, Germ Aversion–Perceived Vulnerability to Disease mean scores, cumulative empathy score from the Empathy Components Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy. ISC = Intermittent Self-Catheterization.

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend

negative behaviours indicated that the women disclosing ISC was rated less negatively than the control woman.

There was a significant overall multivariate group effect with a medium effect size across the three variables, $F(3, 204) = 3.78$, $p = .011$, $\eta^2 = .053$, indicating that the groups differed in terms of negative perceptions. These findings suggest that the female target who disclosed ISC was perceived less negatively than the control target who did not disclose ISC. Follow-up ANCOVAs (see Table 14) indicated that, compared to participants rating the control target, those rating the ISC low disclosure target reported having significantly fewer: (a) negative cognitions about her, with a medium effect size ($p = .001$, $\eta^2 = .051$); (b) intended negative behaviours, with a small effect size ($p = .020$, $\eta^2 = .026$), and (c) negative emotions towards her, with a small effect size ($p = .043$, $\eta^2 = .020$). Participants reported feeling fewer negative emotions, cognitions, and behavioural intentions when evaluating the female target who disclosed ISC than participants evaluating the control female target. Figure 1 illustrates these findings.

Hypothesis 3: Female targets disclosing use of a colostomy bag will be perceived more negatively/less positively than women who disclose ISC, with the least negative/most positive perceptions detected towards controls who do not have a medical condition.

Two separate 3-group MANCOVAs (control vs. colostomy vs. ISC low disclosure) were conducted, one for *positive* perceptions and one for *negative* perceptions. For each MANCOVA, the three groups were compared on three DVs from the Receptivity to New Friends Scale (i.e., affective, cognitive, and overall behavioural subscale scores).

Positive Perceptions MANCOVA. The unadjusted means and *SD*s of the three DVs (positive affect, positive cognitions, and positive overall behaviours) are presented in Table 15.

Table 15

Hypothesis 3: Unadjusted Means (SDs) and ANCOVA Results for Three Groups (Control, Colostomy and ISC Low Disclosure) for the Three Subscales of the Receptivity to New Friends Scale for Both Negative and Positive Perceptions

Subscale	Control Group	Colostomy Group	ISC Low Disclosure Group	*df*	*F*	*p*	η^2
Positive	(*n* = 105)	(*n* = 109)	(*n* = 107)				
Affect**	3.14 (0.61)[a]	3.40 (0.58)	3.37 (0.63)	2, 312	5.23	.006	.032
Cognitions***	3.92 (0.35)[a]	4.07 (0.41)	4.13 (0.45)	2, 312	8.41	< .001	.051
Behaviours*	7.54 (0.97)[b]	7.95 (0.84)[b]	7.86 (1.00)	2, 312	3.48	.032	.022
Negative	(*n* = 104)	(*n* = 109)	(*n* = 109)				
Affect[t]	0.21 (0.14)	0.17 (0.13)	0.17 (0.13)	2, 313	2.66	.072	.017
Cognitions**	2.25 (0.50)[b]	2.14 (0.49)	2.03 (0.57)[b]	2, 313	6.01	.003	.037
Behaviours*	1.97 (0.24)[b]	1.89 (0.25)	1.88 (0.30)[b]	2, 313	3.12	.046	.020

Note. Variables pertaining to the positive perceptions MANCOVA are shown above the dotted line. Higher scores indicate more positive perceptions. Variables below the dotted line pertain to the negative perceptions MANCOVA. Higher scores indicate more negative perceptions. While the means presented here are not adjusted, the statistical analyses represented here are adjusted for the following covariates: ISC index scores, colostomy index scores, social desirability scores, Germ Aversion–Perceived Vulnerability to Disease mean scores, cumulative empathy score from the Empathy Components Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy. [a] Group differences between the indicated group and the other two groups. [b] Group differences between the two indicated groups. ISC = Intermittent Self-Catheterization.

[t] $p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. ([t] = trend).

There was a significant overall multivariate group effect with a small-medium effect size, $F(6, 622) = 4.06$, $p < .001$, $\eta^2 = .038$, suggesting the three groups differed in terms of how positively the three female targets were perceived. Follow-up univariate ANCOVAs are presented in Table 15. The three groups differed in positive emotions toward the female targets (i.e., control, colostomy user, ISC user), with a small-medium effect size ($p = .006$, $\eta^2 = .032$). Pairwise comparisons indicated that the control group was evaluated significantly less positively than the colostomy group ($p = .021$) and the ISC group ($p = .012$). However, there was no significant difference between the colostomy and ISC groups ($p = 1.000$). The three groups differed in positive cognitions about the female targets with a small-medium effect size ($p < .001$, $\eta^2 = .051$). Pairwise comparisons indicated that the control woman was evaluated significantly less positively than the woman disclosing colostomy ($p = .040$) and the woman disclosing ISC ($p < .001$). However, there was no significant difference between the colostomy and ISC groups ($p = .322$). The three groups also differed in intended positive behaviours toward the female targets, with a small effect size ($p = .032$, $\eta^2 = .022$). Only the control and colostomy groups differed significantly, with the colostomy group rated more positively ($p = .037$).

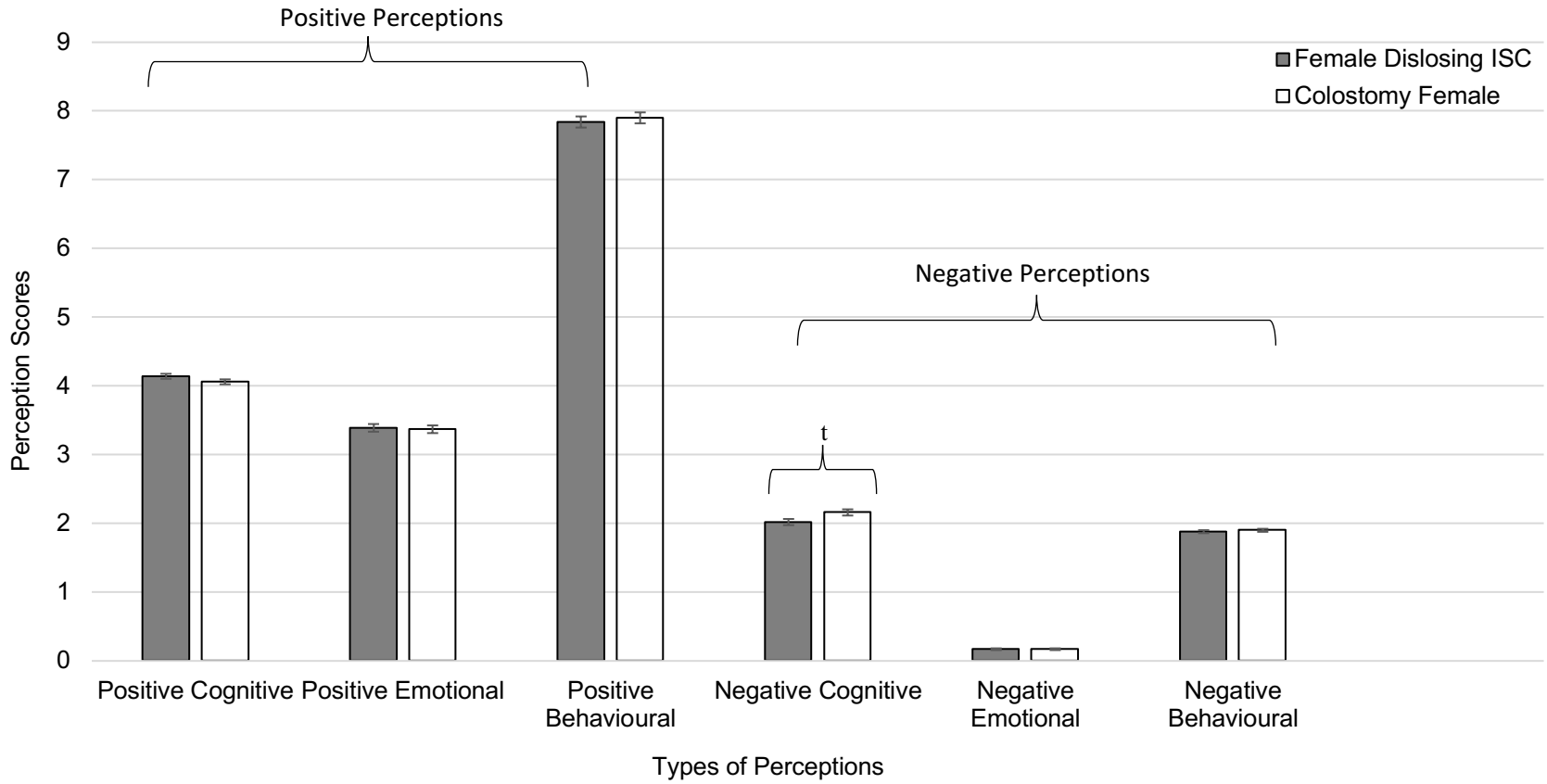
The evaluation of group differences in positive perceptions is illustrated by the left side of figures 2a and 2b (see Figure 2).

Negative Perceptions MANCOVA. The unadjusted means and *SD*s of the three DVs (positive affect, positive cognitions, and positive overall behaviours) are presented in Table 15.

There was a significant overall multivariate group effect with a small effect size, $F(6, 624) = 2.59$, $p = .017$, $\eta^2 = .024$, indicating that the three groups differed in terms of how negatively they perceived their randomly assigned female target. Follow-up univariate ANCOVAs are presented in Table 15. A non-significant trend for group differences, with a small

Figure 2a

Positive and Negative Perceptions of a Female Disclosing ISC Use Versus Use of a Colostomy Bag: Cognitive, Emotional, and Behavioural Subscales of the Receptivity to New Friends Scale (Hypothesis 3)



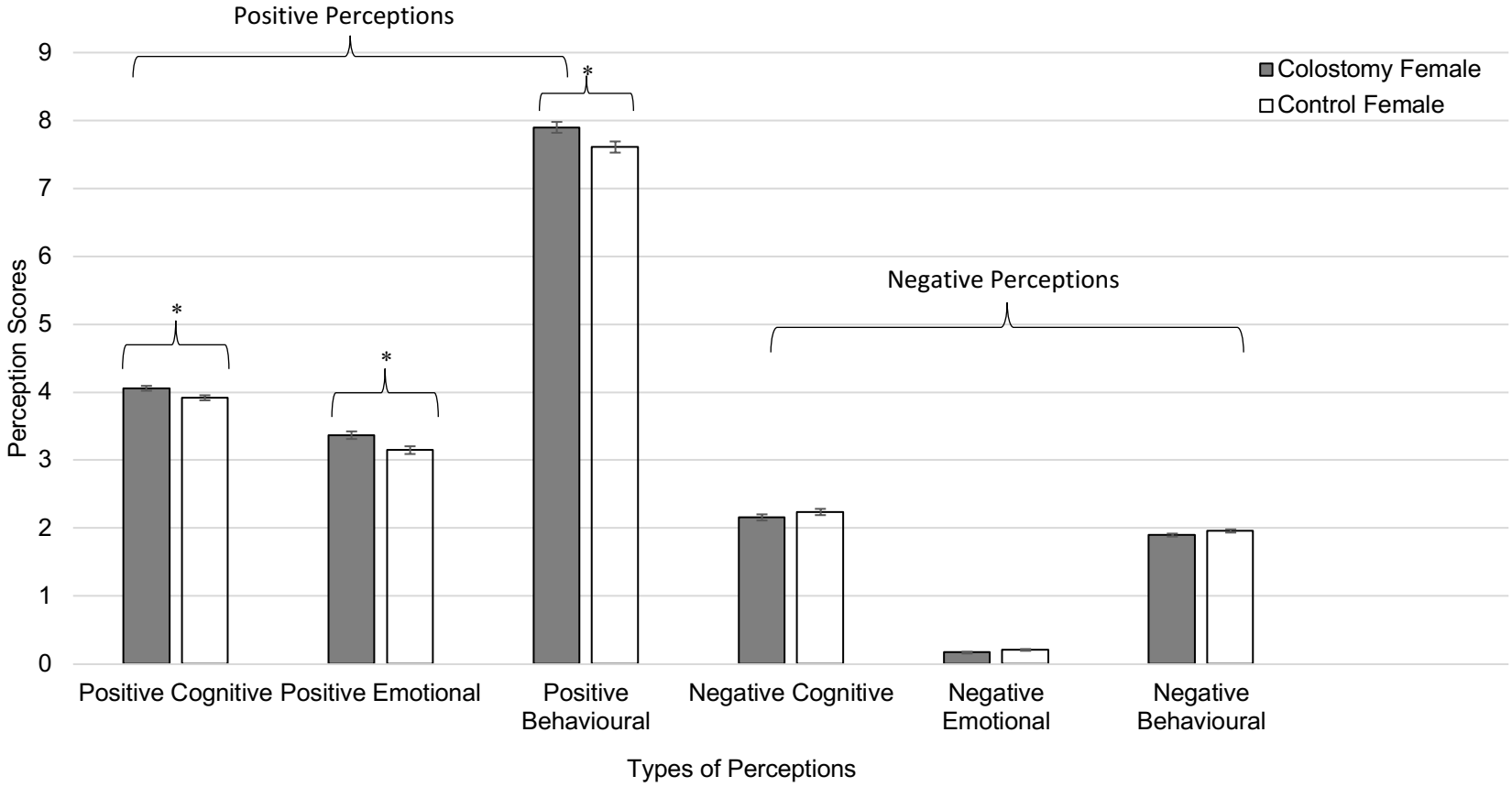
Note: Means are untransformed and adjusted for the following covariates: ISC index scores, colostomy index score, social desirability scores, Germ Aversion–Perceived Vulnerability to Disease mean scores, cumulative empathy scores from the Empathy Components

Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy. ISC = Intermittent Self-Catheterization.

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

Figure 2b

Positive and Negative Perceptions of a Female Disclosing Use of a Colostomy Bag vs. A Control Woman: Cognitive, Emotional, and Behavioural Subscales of the Receptivity to New Friends Scale (Hypothesis 3)



Note: Means are untransformed and adjusted for the following covariates: ISC index scores, colostomy index score, social desirability scores, Germ Aversion–Perceived Vulnerability to Disease mean scores, cumulative empathy scores from the Empathy Components

Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy. ISC = Intermittent Self-Catheterization.

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

effect size, emerged for intended negative affect towards the targets ($p = 0.072$, $\eta^2 = .017$). The three groups differed in negative cognitions about the female targets with a small-medium effect size ($p = .003$, $\eta^2 = .037$). Pairwise comparisons demonstrated that the control group differed significantly from the ISC group ($p = .002$), with the control group rated more negatively. However, the control group did not significantly differ from the colostomy group ($p = .606$). A non-significant trend for the colostomy group being evaluated more negatively than the ISC group ($p = .091$) emerged. The three groups also differed in intended negative behaviours toward the female target, with a small effect size ($p = .046$, $\eta^2 = .020$). Post-hoc comparisons found that only the control and ISC groups differed ($p = .048$), with the control group evaluated more negatively.

The evaluation of group differences in negative perceptions is illustrated by the right side of figures 2a and 2b (see Figure 2).

Hypothesis 4: Detailed disclosure about intermittent catheterization will (a) reduce negative perceptions and (b) increase positive perceptions of women who ISC.

Two separate 2-group (ISC low disclosure vs. ISC high disclosure) MANCOVAs were conducted, one for *positive* perceptions and one for *negative* perceptions. For each MANCOVA, the two groups were compared on three DVs from the Receptivity to New Friends Scale (i.e., affective, cognitive, and overall behavioural subscale scores).

Positive Perceptions MANCOVA. The unadjusted means and *SD*s of the three DVs (positive affect, positive cognitions, and positive overall behaviours) are presented in Table 16. There was no significant overall multivariate group effect, $F(3, 199) = 0.40$, $p = .753$, $\eta^2 = .006$. These findings suggest that the level of disability disclosure (low vs. high) related to ISC use did

Table 16

Hypothesis 4: Unadjusted Means (SDs) for ISC Low Disclosure and ISC High Disclosure Groups on the Three Subscales of the Receptivity to New Friends Scale for Both Negative and Positive Perceptions

Perception Subscale	ISC Low Disclosure	ISC High Disclosure
Positive	(*n* = 107)	(*n* = 101)
Affect	3.37 (0.63)	3.36 (0.58)
Cognitions	4.13 (0.45)	4.07 (0.46)
Behaviours	7.86 (1.00)	7.78 (1.08)
Negative	(*n* = 109)	(*n* = 101)
Affect	0.17 (0.13)	0.18 (0.15)
Cognitions	2.03 (0.57)	2.11 (0.55)
Behaviours	1.88 (0.30)	1.88 (0.29)

Note. Variables pertaining to the positive perceptions MANCOVA are shown above the dotted line. Higher scores indicate more positive perceptions. Variables below the dotted line pertain to the negative perceptions MANCOVA. Higher scores indicate more negative perceptions. While the means presented here are unadjusted, the ANCOVA results represented here were adjusted for the following covariates: ISC index scores, social desirability scores, Germ Aversion–Perceived Vulnerability to Disease mean scores, cumulative empathy scores from the Empathy Components Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy. ISC = Intermittent Self-Catheterization.

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

not affect participants' positive perceptions of women who use ISC. It is noteworthy that the direction of some of the means was also in the direction opposite to the hypothesis.

Negative Perceptions MANCOVA. The unadjusted means and *SD*s of the three DVs (negative affect, negative cognitions, and negative behaviours) are presented in Table 16. The MANCOVA examining negative perceptions as a function of level of disability disclosure (low vs. high) revealed no significant overall multivariate group effect, $F(3, 201) = 0.64$, $p = .593$, $\eta^2 = .009$. These findings indicate that the level of disability disclosure (low vs. high) related to ISC use did not affect participants' negative perceptions of women who use ISC. Again, the direction of most of the means was also in the direction opposite to the hypothesis.

Hypothesis 5: (a) Individuals will be less likely to want to pursue a friendship with a woman who discloses ISC as compared to women who does not disclose ISC. (b) Differences in disability disclosure (low vs. high) will affect the likelihood that individuals will want to pursue a friendship with a woman who uses ISC.

Two separate 2-group (control vs ISC low disclosure; ISC low disclosure vs. ISC high disclosure) MANCOVAs were conducted. For each MANCOVA, the two groups were compared on two DVs: a) score on the Desire for Friendship Item; and b) mean scores on the Desire for Friendship Scale.

Control vs. ISC Low Disclosure MANCOVA. The unadjusted means and *SD*s of the two DVs are presented in Table 17. There was no significant overall multivariate group effect, $F(2, 201) = 1.68$, $p = .189$, $\eta^2 = .016$. These findings suggest that participants did not differ in their desire/intentions to pursue a friendship with a target woman who disclosed engaging in ISC versus one who did not.

Table 17

Hypothesis 5: Unadjusted Means (SDs) for Control and ISC Low Disclosure Groups on the Level of Friendship Item and the Desire for Friendship Scale Scores

Item/Scale	Control (n = 101)	ISC Low Disclosure (n = 108)
Level of Friendship [t]	4.32 (1.18)	4.64 (1.16)
Desire for Friendship	3.55 (0.44)	3.67 (0.49)

Note. Higher scores indicate wanting a closer friendship with the target or a stronger desire for friendship with the target. While the means presented are unadjusted, the statistical analyses represented here are adjusted for the following covariates: ISC index scores, social desirability scores, Germ Aversion–Perceived Vulnerability to Disease mean scores, cumulative empathy scores from the Empathy Components Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy. ISC = Intermittent Self-Catheterization.
[t] $p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. ([t] = trend).

ISC Low Disclosure vs. ISC High Disclosure MANCOVA. The unadjusted means and *SD*s of the two DVs (Level of Friendship item, Desire for Friendship Scale mean) are presented in Table 18 for both disclosure groups. The MANCOVA testing whether level of disability disclosure (low vs. high) affected participants desire to pursue a friendship with a women who uses ISC identified no significant overall multivariate group effect, $F(2, 198) = 0.41$, $p = .664$, $\eta^2 = .004$. Thus, level of disability disclosure related to ISC use, did not affect participants desire to pursue a friendship with a woman who uses ISC, or the type/level of friendship they would want to pursue.

Table 18

Hypothesis 5: Unadjusted Means (SDs) for ISC Low Disclosure and ISC High Disclosure Groups on the Level of Friendship Item and the Desire for Friendship Scale Scores

Item/Scale	ISC Low Disclosure (n = 108)	ISC High Disclosure (n = 98)
Level of Friendship	4.64 (1.16)	4.64 (1.16)
Desire for Friendship	3.67 (0.49)	3.70 (0.47)

Note. Higher scores indicate wanting a closer friendship with the target or a stronger desire for friendship with the target. While the means presented here are unadjusted, the statistical analyses represented here are adjusted for the following covariates: ISC index scores, social desirability scores, Germ Aversion–Perceived Vulnerability to Disease mean scores, cumulative empathy scores from the Empathy Components Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy.

ISC = Intermittent Self-Catheterization.

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

Discussion

Main Findings

The study revealed six main findings related to perceptions of women disclosing ISC. First, there was mixed support for hypothesis one. Although BIS activation and disgust did not significantly predict negative perceptions of women who disclose ISC when controlling for social desirability, they did become significant predictors when empathy and sympathy were included as covariates. Second, empathy emerged as a significant unique predictor of negative perceptions of women disclosing ISC, as empathy and sympathy explained 27% of the variance beyond social desirability alone. Third, contrary to hypothesis two, the woman disclosing ISC was not perceived more negatively than a control woman. Instead, the woman disclosing ISC was perceived more positively than the control woman. These group effects were strongest for cognitive perceptions compared to emotions and behaviours. Fourth, no support was found for hypothesis three, as the woman who disclosed ISC was not perceived differently than the woman who disclosed use of a colostomy bag. The woman disclosing use of a colostomy bag was perceived more positively and less negatively than the control woman. Fifth, inconsistent with hypothesis four, level of disclosure (low vs. high) had no effect on perceptions of a woman disclosing her ISC (i.e., no group differences). Lastly, inconsistent with hypothesis five, neither the disclosure of ISC nor the level of disclosure influenced participants intentions to pursue a friendship with the target woman.

Behavioural Immune System Activation Explains Little Variance in Negative Perceptions While Empathy Emerges as a Strong Predictor

This study found mixed evidence supporting hypothesis one. Contrary to hypothesis one, BIS activation and more specifically disgust sensitivity, disgust propensity, and pathogen disgust, did not significantly predict negative perceptions of women using ISC in regression

analyses when social desirability was controlled for. Although small significant positive correlations between disgust sensitivity, disgust propensity, and pathogen disgust and negative perceptions were found with simple correlations, this was partly due to social desirability. In order to examine the partial correlations when social desirability was statistically controlled these were calculated (see Appendix T). Disgust propensity and pathogen disgust both lost significance when social desirability was statistically controlled, and only disgust sensitivity remained significant, r (210) = .15, p = .034. Thus, disgust sensitivity appears to explain approximately 2 to 3% of variance in negative perceptions based on partial correlations and regressions.

The results of the second regression analysis revealed that empathy was a significant, and the strongest, predictor of negative perceptions as empathy was a unique predictor and explained the most variance in participants' responses. A one-point increase in empathy was associated with a 0.52-point decrease in negative perceptions. Empathy also moderated the effect of disgust on negative perceptions. Empathy and sympathy explained 26% of the variance in negative perceptions over and above social desirability, resulting in a total of 29% explained variance. Finally, when the BIS measures were added to the model, they contributed an additional 2-3% to the model, which was significant, bringing the total explained variance to 31%. Empathy remained a strong unique predictor and disgust sensitivity also emerged as a unique predictor in this final model. A key finding of this regression model is that controlling for empathy resulted in disgust sensitivity being a significant and unique predictor of negative perceptions, which did not occur in the first regression model described above that did not include empathy. This suggests that empathy may moderate the effect of disgust sensitivity on negative perceptions of women disclosing ISC. To see if this is a general finding related to perception of people/women

or specific to ISC, a supplementary analysis was conducted where the same analysis was run on the control group, which was not exposed to the female ISC target (see Appendix U). In this regression, empathy again emerged as a predictor of negative perceptions, but it explained less variance in this model (15%) compared to the model for groups exposed to the ISC target (26%). Importantly, in this control analysis, BIS and disgust did not explain negative perceptions when controlling for empathy. Thus, BIS activation and disgust appear to interact with empathy to contribute to negative perceptions of women disclosing ISC, but do not explain negative perceptions of control women alone.

While this is the first exploration of how disgust affects perception of people who disclose ISC, the above findings somewhat challenge existing research on disgust in other disabilities. That research has shown that individual differences across various components of disgust significantly influence negative perceptions of different disabling conditions (e.g., Dawydiak et al., 2020; Papathanasiou & Stylianidis, 2022), but these studies did not examine or include the role of empathy. First, Dawydiak et al. (2020) found that increased pathogen disgust was positively associated with the stigmatization of individuals with three mental health conditions that are considered invisible disabilities: (a) Schizophrenia; (b) skin picking disorder; and (c) sexual sadism disorder. Second, Papathanasiou and Stylianidis (2022) found that various mental health professionals with high levels of disgust sensitivity and disgust propensity displayed more negative attitudes toward individuals with an invisible disability, specifically borderline personality disorder. The current findings are also contrary to previous work linking BIS activation and negative perceptions of non-contagious cues heuristically associated with pathogens (e.g., van Leeuwen & Jaeger, 2022). For example, participants high in disgust sensitivity were more likely to avoid individuals with non-infectious conditions, such as acne,

due to perceiving them as less health healthy and feeling discomfort with physical contact (van Leeuwen & Jaeger, 2022). Thus, the present findings suggest that disgust sensitivity only explains 2 to 3% of variance and may interact with empathy to affect negative perceptions of ISC while previous research suggests larger direct effects of disgust sensitivity on negative perceptions of other disabilities.

The finding that empathy emerged as a unique predictor aligns with Webb et al. (2016), who reported a significant negative relationship between empathy and disability-related stigma, with empathy serving as a significant predictor of disability stigma in regression analysis. The results of the current study showing that statistically controlling for empathy made disgust a significant predictor in the model supports the proposition that empathy and disgust sensitivity both influence responses to disability. Stone and Potton (2014) demonstrated that participants viewing disfigured faces reported elevated levels of empathy but did not experience more negative emotions and disgust sensitivity. Additionally, the finding that social desirability was a predictor of perceptions is corroborated by Stone and Potton's (2014) study, which revealed that participants reported more disgust and less empathy when viewing disfigured faces under conditions of high anonymity, as compared to conditions with lower anonymity. Taken together with the current findings, this suggests that social desirability may influence self-reports of perceptions of people with a variety of disabilities.

A plausible explanation for the current findings is that empathy moderates the relationship between disgust and negative perceptions of ISC, given that disgust sensitivity became significant only after empathy was controlled for in the model. There may be an interaction between empathy and disgust when perceiving disability and forming perceptions, which suggests that the relationship between disgust and perceptions of ISC may not be direct

and may be influenced by additional emotional responses, such as empathy. Empathy may provide a buffering effect by counteracting instinctive negative emotional responses (e.g., disgust) that some individuals feel when encountering disability. The argument that the BIS and disgust play a secondary role in shaping perceptions compared to other constructs like empathy is also supported by the fact that, when significant, BIS measures contributed minimally to predicting negative perceptions, despite expectations based on evolutionary psychology theories that the BIS would have a stronger impact.

It is also possible that the private nature of ISC may have impacted perceptions, which would explain why findings differ from other disabilities. Since ISC is typically performed in private (depending on the severity of the underlying condition), it is unlikely that friends or acquaintances will witness it directly. ISC supplies can also be discreetly stored in a small pouch, with the catheter being inserted and removed when going to the bathroom and then disposed of. While disgust is primarily triggered by bodily fluids and wastes (Curtis & Biran, 2001), and body parts like the anus, genitals, and mouth (Tybur et al., 2013), the private nature of ISC significantly reduces exposure to the triggers that can yield negative perceptions. Moreover, a prominent line of thought in BIS research states that non-contagious disabilities are perceived negatively because of their morphological deviation from the healthy prototype stored in memory (Nussinson et al., 2018). Since learning and focusing on the healthy prototype is easier, the BIS more readily interprets any deviations as potential health threats (Ackerman et al., 2018; Kurzban & Leary, 2001; Nussinson et al., 2018). So, although ISC involves bodily fluids which are known to trigger disgust and negative reactions, it is a private practice that is carried out in the bathroom, which is already a private space regardless of disability. This limits exposure to visible morphological deviations or bodily fluids, reducing the likelihood of triggering aversive

reactions. This may reinforce the perception that individuals using ISC are non-contagious, reducing concerns about infection and negative perceptions. As a result, the BIS of participants may have conducted a cost-benefit analysis where the perceived costs of pathogen exposure were low due to the private nature of ISC, limited contact with another individual's bodily fluids, and no visible signs of disability or infection. The benefits of potential friendship could have outweighed these low costs, preventing the BIS from activating disgust and influencing negative perceptions.

Implications of Empathy and BIS Activation in Shaping Perceptions of Females Using ISC

The primary implication for the above findings is that empathy plays a crucial role in shaping how women who disclose ISC are perceived and potentially people with other disabilities. Interventions aimed at improving attitudes towards ISC and disability should focus on enhancing empathy. Such approaches may be more effective in changing societal attitudes than existing approaches that do not emphasize empathy. These interventions may foster a deeper understanding of the challenges faced by individuals with disabilities and may reduce negative perceptions by encouraging more supportive and open-minded attitudes. There is evidence demonstrating that empathy training (e.g., simulation, empathy activities, exposure to empathy-enhancing media) supports the development of more positive perceptions of disabilities (Ahn et al., 2013; Bartsch et al., 2018; Choi & Song, 2007; Levett-Jones et al., 2017; McArthur et al., 2016). Additionally, interventions addressing perceptions of disability should keep the impact of social desirability in mind. Individuals may report more favourable attitudes towards disability due to social expectations, even if these attitudes do not reflect their true thoughts and feelings. If social desirability is not considered when designing interventions meant to improve attitudes toward disability or controlled for in analyses testing the effectiveness of such

interventions, this bias may skew results and lead to an overestimation of acceptance toward disability. By accounting for social desirability bias in intervention design and evaluation, it will be possible to ensure that any shifts in attitudes are authentic and reflect genuine empathy towards individuals with disabilities.

Females Disclosing ISC or Colostomy were Not Perceived More Negatively than Controls

Inconsistent with hypothesis two, a woman disclosing ISC use was perceived more positively than the control woman who did not make a disability disclosure. Participants expressed more positive emotions and cognitions toward the female disclosing ISC than the control female (and a non-significant trend for intended positive behaviours). Participants also reported fewer negative emotions, cognitions, and behavioural intentions toward the woman disclosing ISC. For both positive and negative perceptions, group effects were strongest for cognitive perceptions over emotions and intended behaviours.

Although this research question has not been previously examined, these experimental findings are particularly relevant as they contradict existing research on the expectations of people who use ISC. Previous studies (e.g., Kelly et al., 2014; Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 2003) suggest that women using ISC anticipate stigma for having to use ISC and for behaviours and situations related to ISC use (e.g., taking longer in the bathroom). This study did not support the hypothesis that perceivers elicited stigmatizing attitudes towards women using ISC. While the findings are optimistic, the results could be due to possible limitations related to study methods (discussed below), and require replication.

Hypothesis three was not supported as participants reported feeling more positive emotions, having more positive cognitions, and more positive behavioural intentions when evaluating the female disclosing colostomy compared to the control female without a disability.

Positive perceptions of the female using a colostomy and the female using ISC did not differ significantly (i.e., no group differences). Thus, both the female disclosing ISC and the female disclosing colostomy were viewed similarly in terms of positive perceptions, with no clear preference for one over the other. With respect to negative perceptions, ratings of the female disclosing colostomy and the control female did not significantly differ. There were no significant differences in negative emotions or behavioural intentions between the female disclosing colostomy and the female using ISC. However, a non-significant trend for cognitions suggested that participants held fewer negative thoughts about the female disclosing ISC than about the female disclosing colostomy. While there were no significant group differences, the largest effect sizes were noted for cognitions for both positive and negative perceptions. Although only somewhat related, a study by Smith et al. (2007) yielded contrasting results. While they did not measure emotional and cognitive negative perceptions, they found that participants with high (versus low) disgust sensitivity expressed a stronger desire to distance themselves from individuals disclosing colostomy (i.e., a stronger behavioural response).

Possible Explanations for the Positive Perceptions of Females Disclosing ISC or Colostomy

There are a few factors to consider that may account for the lack of negative perceptions toward female targets disclosing ISC or colostomy. First, one possible explanation is that the female targets disclosing ISC or colostomy were not viewed as a true stranger. Previous studies have shown that strangers evoke more disgust than familiar people (Lenk et al., 2019). Participants may have viewed Olivia as more of a familiar person, given that a mutual friend was introducing her. This could account for the lack of negative perceptions, since the bodily fluids of friends elicit less disgust and aversion than those of strangers (Curtis et al., 2004; Peng et al., 2013; Rozin et al., 1989; Stevenson & Repacholi, 2005). Furthermore, the social context may

have shifted the target from being a distant stranger to a potential friend. People are more comfortable with possible pathogen exposure when interacting with highly valued individuals, such as friends, compared to those with lower interpersonal value, like strangers (Cao et al., 2022). This increased comfort could have made participants more willing to engage with Olivia and less likely to experience disgust or avoidance triggered by unfamiliar others, reducing negative perceptions. If participants did view the target as less of a stranger and more of a friend, then the findings would be of more relevance to disclosure in the context of potential friends versus strangers.

These findings may also be related to the perceived controllability of the disabilities associated with using ISC and a colostomy bag. Researchers have shown that individuals with a disability that is perceived to be controllable (e.g., obesity, hearing impairment due to listening to loud music) are evaluated more negatively than when disabilities are perceived as non-controllable (e.g., hearing impairment due to an ear infection, in a wheelchair from a no-fault auto collision; Hebl & Kleck, 2002; Lyons et al., 2017). Participants may have perceived the use of ISC or having a colostomy as being out of the control of the female target, leading them to view the disability less negatively since these conditions were not interpreted as resulting from personal choices or behaviour. Additionally, the perception that women using ISC or with a colostomy are trying to actively manage a health condition beyond their control may have led participants to recognize their autonomy and agency, contributing to more positive evaluations. It is also possible that the private nature of ISC and colostomy, as discussed earlier with ISC, may have affected perceptions, leading to both medical practices not being perceived as disabilities. Without the usual triggers of bodily fluids and visible morphological deviations, negative

stereotypes typically associated with disability may not have been activated, resulting in fewer negative perceptions and more positive perceptions.

Level of Disclosure Did Not Affect Perceptions of Females Using ISC

Contrary to hypothesis four, the present study found that the level of disability disclosure related to ISC use – whether providing minimal (low disclosure) or more detailed information (high disclosure) – did not affect participants' positive or negative perceptions of women who use ISC. This is the first study to examine how level of disability disclosure affects perceptions in the context of ISC and how disclosure impacts friendship intentions with someone using ISC. However, these results align with those obtained by Dalgin and Bellini (2008) who found that the extent of disability disclosure did not significantly impact employers' hiring decisions and perceptions of employability. Instead, they found that disability type did have a significant effect. Regardless of how much disability information was disclosed, applicants with a mental health condition (bi-polar disorder) were rated as less employable than applicants with a more physical disability (insulin-dependent diabetes). The current findings also indirectly challenge existing research suggesting that individuals experience discomfort when interacting with people who disclose having an invisible disability (e.g., Kleck, 1968). For example, Kleck (1968) found that participants sat further away from an interviewer who disclosed having epilepsy, compared to when epilepsy was not mentioned, indicating discomfort in the presence of disability disclosure. The present findings add to the limited literature on how level of disclosure affects the perception of people with disabilities.

Disclosing Disability Status and Using ISC Did Not Affect Friendship Intentions

Contrary to hypothesis five, the current study found that participants did not differ in their intentions to pursue a friendship with a woman who disclosed using ISC compared to one

who did not disclose ISC use. Moreover, the level of disability disclosure (low vs. high) had no effect on participants' desire to form a friendship with the woman using ISC or the type of friendship they wished to pursue. These findings suggest that disclosure and level of disability disclosure related to ISC use may not significantly influence perceptions or social intentions in the context of friendship.

While the current study investigated the impact of the level of disclosure on perceivers' perceptions and relationship intentions in the context of friendship, the findings are indirectly supported by research on the timing of disclosure in romantic relationships and in the workplace. In the vignettes used in our study, participants were introduced to the female target, Olivia, who disclosed her ISC status during this first introduction. Comparatively, Shpigelman et al. (2019) examined how the timing of a partner disclosing having an invisible disability (i.e., a mental health condition) affected the perceivers' perceptions of their partner when in a romantic relationship. Their study found that participants who were informed of their partner's condition later (versus earlier) in the relationship reported stronger negative feelings. Hebl and Skorinko (2005) found that applicants who mentioned their physical disability early in a job interview were evaluated more positively than those who disclosed later or not at all. The fact that the level of disability disclosure did not affect perceptions or friendship intentions in the current study may suggest that disclosing ISC use early on, as in our study, may have mitigated potential negative perceptions.

Additional Explanations for the Positive Effect of ISC Disclosure on Perceptions

While one hopes that the findings are accurate in suggesting that ISC disclosure does not lead to stigma, it is important to consider possible explanations and contextual factors that may help clarify the findings. First, it may be that individuals value the personal qualities of being

open and honest and that these qualities override any stigma associated with disclosure of medical details in the context of friendship. Self-disclosure is a necessary component to building relationships, and increasing intimacy and trust (Tardy & Smithson, 2018). Sharing personal information helps individuals assess the potential for future relationships (e.g., friendship) and decide whether to pursue a closer connection (Derlega et al., 2008). When individuals disclose sensitive medical information, receivers of the information may be less affected by hearing the specifics of a disability or ISC use, and may be more positively affected by the perceived trust the individual demonstrates by being open. This trust may mitigate any biased attitudes, since it reflects the discloser's openness and willingness to be vulnerable, traits that are valued in friendships. Studies show that honesty is considered the most important trait in a friend (Akan et al., 2021; Apostolou & Vetsa, 2023). Disability self-disclosure may therefore foster strong connections by signalling honesty, trust, and vulnerability, which may play a more significant role in the formation of perceptions and friendship intentions than the specifics of a disability.

Another possibility is that the phone call condition was not a neutral control condition, which would have biased interpretation of the disclosure conditions. Taking a phone call during a social interaction may be perceived as a subtle form of rejection and signal a desire for space or a break from the current interaction. This behaviour could have impacted how participants interpreted the target's interest in them and may have negatively influenced their decision to pursue a friendship with the target in the phone call condition. Thus, it is possible that the current findings do not reflect a positive effect of disability self-disclosure, but instead suggest that disability self-disclosure was perceived more positively than a social rejection condition. This possibility can be explored in future research using different control conditions and ensuring and assessing their neutrality.

A related explanation for the findings is that context of disclosure matters and the disclosure in the study vignettes followed a "claiming" format (Lyons et al., 2018), where disability disclosure involves highlighting positive aspects to challenge negative stereotypes. While the vignettes did not emphasize the positive aspects of ISC, both the low and high disclosure vignettes brought attention to ISC to explain why Olivia spent more time in the bathroom than expected. The high disclosure vignette also provided information about ISC in pragmatic terms, presenting it as a straightforward medical necessity to manage Olivia's health. Research shows that claiming disability during disclosure results in more positive perceptions, such as being perceived as more competent (Lyons et al., 2018), and happier (Hebl & Skorinko, 2005) than individuals who do not disclose. By presenting ISC in a practical, medical context, negative biases may have been neutralized, leading to minimal impact on Olivia's social appeal. Presenting disability-related information in this way may help reduce stereotypes and promote more balanced perceptions.

A fourth explanation is that regardless of whether a lot or a little information about ISC is disclosed, perceivers may focus more on the functional outcomes that emerge when a condition is shared, such as independence and autonomy, rather than on the disability itself. ISC use may also be seen as a proactive health solution that enables the individual to manage their condition effectively, supporting a normal, active lifestyle. This perceptive could shift attention away from the disability as a limitation and instead lead perceivers to view the user as independent and self-sufficient. Moreover, the belief that ISC is a routine health practice rather than a defining characteristic of disability might prevent ISC from aligning with typical disability stereotypes that can carry negative biases. If ISC is perceived as a necessary and normalized medical task for managing health, it may allow users of ISC to be seen as active, independent, members of their

community, making its disclosure less likely to evoke biased perceptions. Future research could explore this possibility by comparing perceptions of vignettes involving disclosure of the ISC act (as here) versus more detailed disclosure of the dysfunction/disability/symptoms along with the ISC act.

A final possible explanation is that the private nature of ISC could have impacted the effect of disclosure. Friends are typically not involved in assisting with ISC and likely would not witness the practice firsthand. Thus, their knowledge of ISC may be limited to the information shared during disclosure. Due to this limited exposure, disclosure of ISC, whether extensive or minimal, might not provide enough context for individuals to form a strong opinion or judgement. Consequently, perceivers may focus more on the ISC user's other personal attributes and behaviours during social interactions, like being honest and trustworthy, as discussed above, making the specifics of ISC use less influential on perceptions and friendship intentions.

Strengths and Limitations

There are many strengths to the current study, the primary being that it is the first study investigating the role of the BIS, empathy, and disability-self disclosure in the formation of perceptions of a female target using ISC. Primarily, we investigate how both disgust and empathy impact perceptions of an invisible disability, a topic that remains largely unexplored. Unlike most ISC research that focuses on its therapeutic benefits and reasons for non-disclosure by the user, our study takes a different approach and explores whether the practice of ISC and its disclosure are perceived negatively by others using an experimental format. As opposed to a qualitative or survey approach that could ask people how they perceive someone disclosing ISC, random assignment of participants to vignette conditions provided strong experimental controls as did the inclusion of numerous covariates such as social desirability and exposure/familiarity

with ISC or disability. Another strength of this study is that it focuses exclusively on the perceptions of *women* using ISC, addressing a gap in the literature where most studies on the experience of using ISC have predominantly male samples. We also contribute to the existing literature on disability and ISC disclosure by focusing on an invisible medical physical disability and the unexplored areas of how level of ISC disclosure affects perceptions of women using it and friendship intentions. Lastly, our research also benefits from a reasonably large sample size (n = 482), enhancing the robustness of our findings.

This study has four main limitations that should be considered when interpreting the findings. First, self-report measures were used to assess BIS activation (disgust), empathy, and perceptions of the female target. Self-report data are susceptible to social desirability bias, particularly when addressing sensitive topics such as disability. Although a social desirability measure was included to statistically control for this bias, it does not fully eliminate this concern.

Second, the use of a vignette to present the female target has limitations. While vignettes are useful for exploring reactions in controlled scenarios, they can have limited ecological validity (Evans et al., 2015) and are based on mental imagery, which is more aligned with cognitively focused emotion theories that emphasize individual interpretations of situations (Goetze, 2023). This approach may not be suitable for research anticipating universal emotional responses to certain situations (Goetze, 2023). Participants may respond differently to a hypothetical situation than to a real-life interaction. Despite including a comprehension check to ensure participants read the vignette where participants either indicated “yes” or “no” when asked if they read the experimental vignette, and excluding participants for inattention (using instructed response items interspersed throughout the study), we cannot guarantee participants fully read or engaged with the vignette as intended. A failure to properly attend and read could

introduce recall bias, where participants might misremember or overlook details, affecting the accuracy of their responses. The current findings may be limited to the perception of a new female friend who discloses using a "claiming" format (Lyons et al., 2018) since the vignette in this study employed this style of disclosure. Using a different approach to disclosure or style may lead to different reactions in perceivers. Lastly, describing the female target as taking an important phone call in the control condition may have affected the neutrality of the comparison and been interpreted as social rejection by participants, potentially influencing their perceptions.

A third limitation of this study concerns the development and use of new measures for this study that have not yet been fully validated. While we developed a measure to assess affective, cognitive, and behavioural perceptions of the female target based on a thorough examination of existing validated scales, our measure has not undergone full psychometric validation. Although these scales were modelled after validated measures, our new measure may not reliably capture these constructs in the same way, potentially affecting the accuracy and consistency of the study's results. However, the measures did undergo a content and reliability analysis (see Appendix V and Appendix W) and demonstrated strong internal consistency in the current study. Additionally, disability familiarity indices were created to account for how prior knowledge or close relationships with individuals with disabilities might influence responses. Participants were asked if someone close to them (e.g., family member, friend, coworker) has a disability, uses ISC or a colostomy. However, the subjective nature of "closeness" may limit the measures' reliability and ability in distinguishing between meaningful experience and casual familiarity since relationships with coworkers may lack the depth and emotional proximity of relationships with close friends or family. Nevertheless, it was important to include this control and any limitations are likely overshadowed by the value of its inclusion.

The final limitation of this study is that our sample was predominantly university students and primarily composed of women, which may limit the generalizability of our findings to broader populations. Specifically, women are often shown to have higher levels of empathy (e.g., Pang et al., 2023), which could have influenced the observed findings. Research also suggests that individuals with higher education levels tend to exhibit greater empathy (e.g., Gutiérrez-Cobo et al., 2023). A less educated sample with a more balanced gender distribution or one composed entirely of men might have yielded different results.

Implications of the Findings

Cognitions Shape Perceptions of Females Disclosing ISC

Group differences in perceptions were largest for cognitions (versus emotions or behavioural intentions). This suggests that cognitions may be most important in terms of affecting both positive and negative perceptions. Thus, interventions aimed at improving attitudes towards ISC, colostomy, and disability should focus not only on enhancing empathy, as discussed earlier, but also on targeting cognitions to challenge and reframe negative perceptions. This fits with cognitive-behavioural models of therapy which suggest that targeting cognitions can change emotions and behaviour (Beck, 1964; Fenn & Byrne, 2013). It may be that people view ISC and colostomy as manageable rather than disabling condition, which provides an opportunity to expand traditional definitions of disability. By revising these definitions to acknowledge the diverse and dynamic nature of disability, we can better reflect the reality that disabilities – whether visible or invisible, resulting later in life or from birth, with chronic or episodic symptoms – impact individuals' lives with equal severity. This broader understanding would ensure that all forms of disability are recognized and encourage more open dialogue about disabilities that promote understanding and support, while challenging stereotypes. The positive

perceptions of ISC and colostomy bag disclosure observed in this study combined with the strong evidence for cognitions and empathy suggest the possibility that empathy interventions and education (to change cognitions) may have value in shifting societal views on a range of disabilities. There is evidence suggesting that increasing both empathy and knowledge about an unfamiliar group reduces prejudice and fosters a more informed and compassionate understanding that promotes social acceptance (Pettigrew & Tropp, 2008). This approach can validate those living with disabilities, reduce bias, improve inclusion, and enhance the quality of life for individuals using ISC and living with other disabilities.

Implications for ISC Disclosure

The implications of these findings for disability disclosure in women using ISC are multifaceted. First, the level of disability disclosure regarding ISC use did not significantly influence perceptions, suggesting that receiver discomfort around individuals disclosing their disability status observed in earlier research (Kleck, 1968; Dalgin & Bellini, 2008) may not be applicable to ISC users. This finding is particularly relevant when considering how women navigate disclosure within different relationships, as previous research indicates that many women hesitate to disclose their ISC use due to feelings of shame, embarrassment, and anticipated stigma related to bladder control issues and judgement over taking longer in the washroom (Kelly et al., 2014; Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 2003). Moreover, since neither low nor high levels of disclosure negatively affected perceptions, women may disclose as much or as little information about the ISC process as they feel comfortable with, without fearing negative consequences that are anticipated with disclosure. Future research is needed to examine how disclosure related to the disability/symptoms, versus the medical procedure used, affects perceptions. Nevertheless, these findings suggest that ISC disclosure by a

woman in the context of potential friendship may be less risky than previously thought by women using ISC.

The findings of this study offer important implications for developing interventions and training materials on disability disclosure and sharing ISC use. Adherence is a problem in ISC (e.g. Jannelli et al., 2007) and the primary coping mechanism that predicts adherence to ISC among women is normalization (Kelly et al., 2014; Pickard et al., 2018; Ramm & Kane, 2011; Wilde, 2003). The current literature focuses on normalizing ISC by recognizing its health benefits, such as reducing incontinence, alleviating UTIs, and enabling participation in social activities (Kelly et al., 2014; Pickard et al., 2018; Ramm & Kane, 2011; Shaw et al., 2008; Wilde, 2003). However, normalization can also extend to disclosing ISC use, particularly in supportive contexts like friendships. Replication of the current findings would suggest that training programs could educate ISC users on how disclosure may foster understanding and support. These materials could emphasize that sharing personal health information with friends may not carry the stigma women using ISC fear, encouraging more open communication about ISC in various social settings. Training could also offer strategies for disclosing ISC in a safe, manageable way, helping women control how much they share and helping them feel more confident in managing the disclosure process. Ultimately, while these findings require replication with non-university student samples and while addressing potential alternate interpretations noted above, the findings also demonstrate the potential for reshaping how women approach ISC disclosure, possibly empowering them to share their experiences more confidently and with reduced fear of stigma in the context of friendship.

Future Research

Future research should focus on replicating the findings of the current study, further psychometric analysis of the Receptivity to New Friends measure, and testing the application of this measure to a broader range of disabilities, both visible and invisible. This will provide valuable insights into the measure's generalizability and usefulness in understanding how individuals form their perceptions across different disability contexts. Additionally, using a more diverse sample, such as one with an equal proportion of males and females or individuals with lower education levels, will help determine whether findings can be generalized to other groups. It would also be valuable to incorporate physiological measures (e.g., heart rate, skin conductance, facial expressions) and/or an IAT measuring disability stigma alongside self-report data to identify any potential discrepancies between individuals' reported attitudes and their automatic implicit reactions. This approach would offer a more comprehensive view of disability perceptions, particularly when trying to examine automatic biological reactions associated with the BIS.

Additional research is needed to explore the relationship between empathy and disgust in disability perception. The interaction between these two emotions is complex and largely unexplored. Understanding how one emotion amplifies or attenuates the impact of the other in the context of disability can reveal how their interaction contributes to stigma, shapes biases, and affect social interactions. Future studies on ISC and colostomy bag use perceptions should prioritize exploring cognitions. In the current study, the strongest group differences in perceptions when control targets were compared to ISC or colostomy targets was noted among cognitions (as opposed to emotions or behaviours). According to cognitive-behavioural theories which state that thoughts influence emotions and behaviours (Beck, 1964; Fenn & Byrne, 2013),

targeting negative or inaccurate beliefs about ISC can reshape emotional responses and actions. This research could inform interventions and educational efforts to reduce disability stigma.

Future research is encouraged to explore how ISC disclosure affects perceivers' perceptions of women using ISC across different relationship types (e.g., prospective vs established romantic relationships and friendships; stranger). In the current study, the level of ISC-related disclosure, whether minimal or detailed, had little impact on positive and negative perceptions, and friendship intentions. However, perceptions could differ in romantic relationships, as this relationship involves intimacy and is more "high risk" than a friendship. For example, men and women who learn a potential partner must use ISC might may worry about the hereditary aspect of the disability that results in the need to use ISC (e.g., neurogenic bladder, Spina Bifida). As this has potential impact for offspring fitness and future caregiving demands related to offspring or the potential partner, such information may affect the decision to pursue a relationship. This also applies to individuals in committed relationships. Thus, another important variable to investigate is how ISC disclosure impacts relationship dynamics in established romantic partnerships, as it may affect decisions about the future of the relationship. It is also worthwhile to examine how the timing and amount of information shared during ISC disclosure impacts perceptions and relationship outcomes. For example, it would be valuable to explore whether gradual, minimal disclosure, or detailed, immediate disclosure leads to more positive perceptions and acceptance. Future research should also examine how ISC disclosure affects perceptions when ISC use is shared, rather than a friend of a friend, as was the case in the current study. Investigating these variables will help identify the most effective ISC disclosure strategies for different relationships and assist women in navigating the process of sharing personal health information.

A final recommendation is to compare how perceptions of a target using ISC differ within a vignette/biography versus in-person (video or real-life), with the same information presented in both formats. This approach would help determine how the mode of delivery affects perceptions of individuals using ISC. With so much communication now happening online, understanding how information presented in written text or in live interaction influences perceptions is important for informing how disability-related information is shared in digital spaces. It would be useful to compare affective perceptions in experimental studies such as this one to how perceivers report that they would prefer to receive the information. Relatedly, determining whether a situation that is used as a control condition, such as taking a phone call, is truly neutral is valuable for further enhancing the validity of findings and ensuring any observed effects are accurately attributed to the experimental manipulations. A longitudinal research design would also be beneficial to track how perceptions evolve over time as individuals become more familiar with someone using ISC or living with a disability. This type of work would provide important information about how increased exposure affects perceptions.

Conclusion

The current study suggests that empathy is as a key predictor of any negative perceptions of ISC disclosure, aligning with previous research emphasizing the role of empathy in reducing disability-related stigma. While disgust, or BIS activation, explains a very small amount of variance in negative perceptions, empathy may moderate disgust in the perception of ISC disclosure. Another important finding is that women disclosing use of ISC or a colostomy bag were perceived more positively and less negatively than control women, and no significant differences were found in perceptions between the latter two groups. The group differences with controls were especially pronounced when examining cognitions. Thus, training or interventions

to enhance empathy and target cognitive evaluations may have the potential to improve perceptions of ISC use, and possibly other disabilities. The study also found that degree of disclosure did not affect perceptions or friendship intentions of a woman disclosing ISC. This suggests that personal qualities, such as honesty, openness, and trustworthiness, may be more influential than potential stigma in shaping perceptions during social interactions. Overall, these findings challenge assumptions about the stigma surrounding ISC use and disability disclosure, highlighting the need for more research on various aspects of disability disclosure (e.g., information share, timing, types of relationships) so that individuals using ISC are better equipped to disclose and feel more comfortable with the process.

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Appendix A: Research Ethics Board (REB) Approval Letter

Research Ethics Board
t: (807) 343-8283
research@lakeheadu.ca

January 22, 2024

Principal Investigator: Dr. Kirsten Oinonen
Student: Claudia Czechowski
Health and Behavioural Sciences\Psychology
Lakehead University
955 Oliver Road
Thunder Bay, ON P7B 5E1

Dear Dr. Kirsten Oinonen and Claudia Czechowski:

Re: Romeo File No: 1470187
Granting Agency: n/a
Agency Reference #: n/a

On behalf of the Research Ethics Board, I am pleased to grant ethical approval to your research project titled, "Perceptions of New Friends: The Role of the Behavioural Immune System in Perception of Disability".

Ethics approval is valid until January 22, 2025. Please submit a Request for Renewal to the Office of Research Services via the Romeo Research Portal by December 22, 2024, if your research involving human participants will continue for longer than one year. A Final Report must be submitted promptly upon completion of the project. Access the Romeo Research Portal by logging into myInfo at:

https://erpwp.lakeheadu.ca/

During the course of the study, any modifications to the protocol or forms must not be initiated without prior written approval from the REB. You must promptly notify the REB of any adverse events that may occur.

Best wishes for a successful research project.

Sincerely,

Dr. Claudio Pousa
Chair, Research Ethics Board

/dg

Appendix B: Recruitment Material for Lakehead University Students

i) Email to Lakehead University Professors

Hello [insert Professor name],

My name is Claudia Czechowski, and I am a graduate student with the Department of Psychology currently recruiting volunteers to participate in my master's thesis project, *Factors Affecting Perceptions of New Friends*. This research project is being conducted under the supervision of Dr. K. Oinonen.

We would greatly appreciate it if you were open to sending the following information to your students and/or if you were willing to share a few minutes of your class time for me to briefly discuss the research project with your students.

Please contact me if you have any questions or require any further clarification.

Thank you for your time,

Claudia Cz.

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ii) Email to Lakehead University Students

Hello Undergraduate/Graduate Student,

My name is Claudia Czechowski, and I am a graduate student with the Department of Psychology currently recruiting volunteers to participate in my master's thesis project, *Factors Affecting Perceptions of New Friends*. This research project is being conducted under the supervision of Dr. K. Oinonen.

The research goal of this study is to explore various factors shaping perceptions and first impressions of potential new friends. The data you have provided may also be used to examine related additional exploratory research questions in the laboratory.

The survey is administered in an online format and should take no longer than 45-60 minutes to complete. As a thank you for your time and participation in this research, you will receive one bonus mark towards an eligible psychology course (if enrolled in one). You may also choose to be entered into a draw for a chance to win one of three $50 (CDN) electronic gift cards from GiftCards.ca.

Eligibility:

- Anyone who is 16 years or older.

If you are interested in participating in our study and are a Lakehead University student taking ***at least one psychology course***, click: [insert SONA link] to access the survey through the Lakehead Sona System. The project is titled "*Perceptions of New Friends*".

If you are a Lakehead University student not enrolled in at least one eligible psychology course, click: [insert SurveyMonkey link].

If you have any additional questions related to this study, please feel free to contact me by email at:

czechowskic@lakeheadu.ca

Thank you for your time,

Claudia Cz.

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iii) Classroom Recruitment Visit Script – Psychology Courses

Hello!

My name is Claudia Czechowski, and I am a graduate student with the Department of Psychology currently recruiting volunteers to participate in my master's thesis project, *Factors Affecting Perceptions of New Friends*. This research project is being conducted under the supervision of Dr. K. Oinonen.

The research goal of this study is to explore various factors shaping perceptions and first impressions of potential new friends. You will be learning about someone new and then asked to complete a questionnaire about your perceptions of that person and if you would like to be their friend. We may also use the data you have provided to examine related additional exploratory research questions in the laboratory.

The survey is administered in an online format and should take no longer than 45-60 minutes to complete. As a thank you for your time and participation in this research, you will receive one bonus mark towards an eligible psychology course. You may also choose to be entered into a draw for a chance to win one of three $50 (CDN) electronic gift cards from GiftCards.ca.

To participate, you must be at least 16 years of age, or older. All sexes and genders are eligible to participate.

If you are interested in participating in our study, please access the survey through the Lakehead Sona System. The project is titled "*Factors Affecting Perceptions of New Friends*".

If you have any additional questions related to this study, please feel free to contact me by email at:

czechowskic@lakeheadu.ca

Thank you for your time and I would greatly appreciate your participation in my study!

iv) Classroom Recruitment Visit Script – Non-Psychology Courses

Hello!

My name is Claudia Czechowski, and I am a graduate student with the Department of Psychology currently recruiting volunteers to participate in my master's thesis project, *Factors Affecting Perceptions of New Friends*. This research project is being conducted under the supervision of Dr. K. Oinonen.

The research goal of this study is to explore various factors shaping perceptions and first impressions of potential new friends. We may also use the data you have provided to examine related additional exploratory research questions in the laboratory.

The survey is administered in an online format and should take no more than no longer than 45-60 minutes to complete. As a thank you for your time and participation in this research, you may also choose to be entered into a draw for a chance to win one of three $50 (CDN) electronic gift cards from GiftCards.ca.

To participate, you must be at least 16 years of age, or older. All sexes and genders are eligible to participate.

If you are interested in participating in our study, please scan the following QR code to access the survey via SurveyMonkey.

QR Code displayed on screen

If you have any additional questions related to this study, please feel free to contact me by email at:

czechowskic@lakeheadu.ca

Thank you for your time and I would greatly appreciate your participation in my study!

Appendix B: Recruitment Poster

RESEARCH PARTICIPANTS NEEDED

Lakehead UNIVERSITY

HHAB Lab

Factors Affecting Perceptions of New Friends Study

PURPOSE:

- Exploring factors that shape perceptions and first impressions of new friends.

FORMAT:

- Web-based survey, hosted by SurveyMonkey.

LENGTH:

- No more than 45-60 minutes

ELIGIBILITY:

- Anyone who is 16 years or older

HOW TO COMPLETE:

- For Lakehead University Students taking **at least one psychology course:**
  [SONA link]

  Study Title: Factors Affecting Perceptions of New Friends

- For the general public & all other Lakehead University Students, please scan the QR code.

COMPENSATION:

1. One bonus mark towards a Lakehead University psychology course accepting bonus credits.

AND/OR

- Chance to win 1 of 3 $50.00 (CAD) electronic gift cards from GiftCard.ca

CONTACTS:
Dr. K. Oinonen, PhD, CPsych, **koinonen@lakeheadu.ca**
Claudia Czechowski, HBSc, MSc Psychological Science Student, **czechowskic@lakeheadu.ca**

This study has been approved by Lakehead University's Research Ethics Board, (807) 343-8283 research@lakeheadu.ca

Appendix C: Experimental Vignettes

Introduction:

Your very good friend Sam would like to introduce you to her new female friend, **Olivia**, because they think you have a lot in common and would get along. You agree to plans to hang out at Sam's house, so that you may get to know Olivia better.

You feel a little nervous and happy to meet someone new. You arrive at Sam's house before Olivia, so you start browsing movies that you all might enjoy watching. A few minutes later Olivia arrives at Sam's house, and you all begin to chat. As you continue getting to know one another, you notice how easy it is for you to get along with Olivia, who seems very nice and funny. You discover that both you and Olivia live in the same neighbourhood, share lots of common interests, and grew up engaging in similar activities/hobbies. All three of you start talking about an upcoming event happening in your city.

Conditions:

a) *Phone Call Control Condition*

After about an hour, Olivia looks at her watch and excuses herself while grabbing her purse. She makes her way to the bathroom, and you and Sam continue your conversation. After 10 minutes in the bathroom, Olivia returns, and you realize she was gone for longer than you expected. She apologizes for abruptly leaving your conversation, explaining she needed to make an important phone call. Sam tells Olivia "No worries, we were just chatting anyways" and all three of you continue conversing.

b) *Colostomy Condition*

After about an hour, Olivia looks at her watch and excuses herself while grabbing her purse. She makes her way to the bathroom, and you and Sam continue your conversation. After 10 minutes in the bathroom, Olivia returns, and you realize she was gone for longer than you expected. She apologizes for abruptly leaving your conversation, explaining she uses a colostomy bag. Sam tells Olivia "No worries, we were just chatting anyways" and all three of you continue conversing.

c) *ISC + Low Self-Disclosure Condition*

After about an hour, Olivia looks at her watch and excuses herself while grabbing her purse. She makes her way to the bathroom, and you and Sam continue your conversation. After 10 minutes in the bathroom, Olivia returns, and you realize she was gone for longer than you expected. She apologizes for abruptly leaving your conversation, explaining she self-catheterizes to urinate. Sam tells Olivia "No worries, we were just chatting anyways" and all three of you continue conversing.

d) *ISC + High Self-Disclosure Condition*

After about an hour, Olivia looks at her watch and excuses herself from the table while grabbing her purse. She makes her way to the bathroom, and you and Sam continue your conversation. After 10 minutes in the bathroom, Olivia returns, and you realize she was gone for longer than you expected. She apologizes for abruptly leaving your conversation, explaining she self-catheterizes to urinate. Sam asks Olivia "What is intermittent self-catheterization?" because neither of you are familiar with the term. Olivia responds, "Intermittent catheterization involves removing urine from the bladder by using a catheter. A catheter is a thin lubricated tube, approximately 4 mm wide and 14 cm long, that is inserted into the bladder through the urethra. The catheter looks like a straw that is closed on one end, with two small, perforated holes on that closed-end. You insert the closed end of the catheter into your bladder through the urethra, and urine begins to immediately empty into the toilet through the open end of the catheter". Sam tells Olivia "Thank you for explaining, and no worries, we were just chatting anyways" and all three of you continue conversing.

Appendix D: Demographics Questionnaire

1. What is your age? _____ years old (numerical)

2. What is your biological sex assigned at birth?
   - ☐ Male
   - ☐ Female
   - ☐ Intersex
   - ☐ Other
   - ☐ I do not know
   - ☐ I prefer not to answer

3. What is your gender?
   - ☐ Boy/man (A gender identity born out of the gender binary. Boys/men have diverse gender expressions)
   - ☐ Girl/woman (A gender identity born out of the gender binary. Girls/women have diverse gender expressions)
   - ☐ Cisgender (The state of identifying with the sex and/or gender assigned to one at birth)
   - ☐ Intersex (A blanket term adopted by those whose biology or physiology diverges from the male/female binary)
   - ☐ Non-binary (The state of not identifying with either of the binary sex and/or gender options, i.e., male/female or man/woman)
   - ☐ Non-conforming (Another term describing the state of not identifying with either of the binary sex and/or gender options, i.e., male/female or man/woman)
   - ☐ Transgender (The state of not connecting to or identifying with the sex and/or gender assigned to one at birth)
   - ☐ Two-spirit (For Indigenous people) (An identity used by many Indigenous folks that describes their gender and/or sexuality, and role within the community. People who are not Indigenous to Turtle Island are not invited to use this term.)
   - ☐ Questioning/exploring (A term adopted by those who haven't (yet) arrived at a label to adequately describe their gendered self. A person can be questioning/exploring for the short or long-term, temporarily, or permanently)
   - ☐ I do not know
   - ☐ I prefer not to answer
   - ☐ None of the above. I identify with another gender: _____

4. What is your sexual orientation?
   - ☐ Exclusively heterosexual
   - ☐ Predominantly heterosexual, only incidentally homosexual
   - ☐ Predominately heterosexual, but more than incidentally homosexual
   - ☐ Equally heterosexual and homosexual
   - ☐ Predominately homosexual, but more than incidentally heterosexual
   - ☐ Predominately homosexual, only incidentally heterosexual
   - ☐ Exclusively homosexual
   - ☐ No socio-sexual contacts or reactions (asexual)
   - ☐ I prefer not to answer

- ☐ I do not identify with the options listed. Other:_____

5. Please indicate your degree of sexual attraction to ***women***.

1	2	3	4	5	6	7	8	9
Not at all attracted to women								Extremely attracted to women

6. Please indicate your degree of sexual attraction to ***men***.

1	2	3	4	5	6	7	8	9
Not at all attracted to men								Extremely attracted to men

7. What is the highest level of education you have completed or are currently undertaking?:
   - ☐ Grade 8 or less
   - ☐ Higher than grade 8, but did not graduate from high school
   - ☐ High school graduate or equivalent
   - ☐ Post-secondary (including some college or university, but did not graduate)
   - ☐ College graduate
   - ☐ University graduate
   - ☐ Post-graduate degree
   - ☐ Diploma/Associated degree
   - ☐ Other, please specify: _____

8. What is the highest level of education your mother/parent has completed?
   - ☐ Grade 8 or less
   - ☐ Higher than grade 8, but did not graduate from high school
   - ☐ High school graduate or equivalent
   - ☐ Post-secondary (including some college or university, but did not graduate)
   - ☐ College graduate
   - ☐ University graduate
   - ☐ Post-graduate degree
   - ☐ Diploma/Associated degree
   - ☐ Other, please specify: _____
   - ☐ I don't know

9. What is the highest level of education your father/parent has completed?
   - ☐ Grade 8 or less
   - ☐ Higher than grade 8, but did not graduate from high school
   - ☐ High school graduate or equivalent
   - ☐ Post-secondary (including some college or university, but did not graduate)
   - ☐ College graduate
   - ☐ University graduate
   - ☐ Post-graduate degree
   - ☐ Diploma/Associated degree

- ☐ Other, please specify: _____
- ☐ I don't know

10. Think about your social network and desire for friends, please indicate how open and interested you are in developing new friendships:
    - ☐ Very slightly or not at all
    - ☐ A little
    - ☐ Moderately
    - ☐ Quite a bit
    - ☐ Extremely

11. How do you identify your race/ethnicity? (Check all that apply)
    - ☐ Aboriginal/Indigenous (e.g., First Nations, Inuit, Métis, etc.)
    - ☐ Arab (e.g., West Asia/ Middle East, North Africa, etc.)
    - ☐ Asian (e.g., Chinese, Japanese, Korean, etc.)
    - ☐ Black Caribbean (e.g., Jamaica, Bahamian, etc.)
    - ☐ Black African (e.g., Nigerian, Somalian, Sudanese, etc.)
    - ☐ Latin American (e.g., Central American, South American, etc.)
    - ☐ South Asian (e.g., Indian, Pakistani, Sri Lanken, Afghan, Nepali, etc.)
    - ☐ Southeast Asian (e.g., Cambodian, Filipino, Loation, Malaysian, Thai, Vietnamese, etc.)
    - ☐ White/Caucasian (e.g., Western European, Eastern European, etc.)
    - ☐ I prefer to self-identify (please specify): _____
    - ☐ I prefer not to answer

12. What is your religious affiliation?
    - ☐ Buddhist
    - ☐ Catholic
    - ☐ Christian
    - ☐ Eastern Orthodox (e.g., Shinto, Jainism)
    - ☐ Hindu
    - ☐ Jewish
    - ☐ Muslim
    - ☐ Protestant
    - ☐ Sikh
    - ☐ Spiritual with no religious affiliation
    - ☐ Not spiritual/no religious affiliation
    - ☐ Other:_____

13. What is the strength of your religious/spiritual beliefs?
    - ☐ Not applicable (no religious affiliation)
    - ☐ Not strong at all
    - ☐ Not very strong
    - ☐ Somewhat strong
    - ☐ Very strong
    - ☐ Extremely strong

14. How much does religion/spirituality influence your beliefs, values, and how you view the world?

- ☐ Not applicable (no religious affiliation)
- ☐ Not at all
- ☐ Slightly
- ☐ Moderately
- ☐ Very much
- ☐ Extremely

15. Do you consider yourself to be committed to your religious/spiritual teachings and traditions?

- ☐ Not applicable (no religious affiliation)
- ☐ Not at all
- ☐ Slightly
- ☐ Moderately
- ☐ Very much
- ☐ Extremely

Appendix E: Perceived Vulnerability to Disease Scale (Duncan et al., 2009)

Appendix F: Disgust Propensity and Sensitivity Scale–Revised (Fergus & Valentiner, 2009)

Appendix G: Pathogen Disgust Subscale from the Three Domains of Disgust Scale
(Tybur et al., 2009)

Appendix H: Marlowe-Crowne Social Desirability Scale-Short Form
(Reynolds, 1982)

Appendix I: Perceptions of New Friends Scale

Vignette

Affect:

Instructions: Individuals experience a variety of *emotions* when they are meeting new people. The following is a list of possible emotions, which may arise during such a situation. Please rate the extent to which you might experience each ***emotion*** during or after the above first meeting with **Olivia**.

1 – Very slightly or not at all
2 – A little
3 – Moderately
4 – Quite a bit
5 – Extremely

1. Tension
2. Stress
3. Nervous
4. Relaxed
5. Calm
6. Fear
7. Upset
8. Distressed
9. Excited
10. Irritable
11. Inspired
12. Disgust
13. Interested
14. Enthusiastic
15. Friendly
16. Happy
17. Jittery
18. Empathy
19. Sympathy

Cognitions:

Instructions: Individuals experience a variety of *thoughts* when they are meeting new people. Below is a list of possible *thoughts* which may arise during or after such a situation. Please rate the likelihood that you might experience each of the following ***thoughts*** during or after meeting **Olivia**.

1 – Extremely Unlikely
2 – Unlikely
3 – Neutral
4 – Likely
5 – Extremely Likely

1. I don't think that Olivia and I will get along well.
2. Olivia seems to be an interesting girl.
3. I hope this meeting with Olivia ends quickly.
4. Olivia seems like an ok person.
5. I don't really feel that Olivia is my kind of person.

6. Olivia and I may get along really well.
7. I don't know what to say to Olivia.
8. Olivia seems friendly.
9. I am not comfortable with "just being myself" around Olivia.
10. Olivia is probably no different from anyone else.
11. I don't think that I would enjoy talking to Olivia again.
12. Why not get to know Olivia better?
13. I don't think that Olivia has many friends.
14. Olivia and I probably have a lot in common.
15. I do not wish to get to know Olivia better.
16. I believe I would very much enjoy talking to Olivia again.
17. I'm glad I'm not Olivia.
18. I would enjoy hanging out with Olivia again.
19. Olivia and I probably do not have a lot in common.

Behaviours:

During:

Instructions: Individuals can behave in a variety of ways when meeting someone for the first time. Below is a list of possible *behaviours* which some people might engage in during such a situation. Please consider the above situation and rate the likelihood that you would ***behave*** in the following manner during this first meeting with **Olivia**.

1 – Extremely unlikely
2 – Unlikely
3 – Neutral
4 – Likely
5 – Extremely likely

1. Move your seat further away from Olivia.
2. End the meeting with Olivia early.
3. Appear friendly (i.e., nodding, smiling) while she is talking.
4. Initiate a conversation with Olivia if she is shy.
5. Find an excuse to leave.
6. Respond to the conversation if Olivia talks or asks questions.
7. Engage in good eye contact with Olivia when interacting with her.
8. Limit conversation with Olivia and interact primarily with Sam.
9. Avoid making eye contact with Olivia when interacting with her.
10. Accept Olivia's offer to wear her sweater when she notices that you are cold.
11. Sit quietly because I don't know what to say to Olivia.
12. Compliment Olivia.
13. Make plans to spend time with Olivia and Sam again.
14. Provide brief responses with little personal information if Olivia asks you questions about yourself.
15. Stay at Sam's house with Olivia longer than you originally planned.

16. Avoid direct conversation with Olivia.
17. Share your contact information (i.e., cell number, social media username/handle) with Olivia.
18. Avoid making future plans with Olivia.

After:

Instructions: Individuals can behave in a variety of ways when meeting someone for the first time. Below is a list of possible *behaviours* which some people might engage in during such a situation. Please consider the above situation and rate the likelihood that you would ***behave*** in the following manner after this first meeting with **Olivia**.

1. Decline Olivia's social media friend/follow requests.
2. Share information about a hobby/event you and Olivia are both interested in.
3. Reach out to Olivia for advice or information.
4. Ignore Olivia if she privately messages you through social media.
5. Invite Olivia to a local event with you & your friends.
6. Help Olivia if you knew she needed help.
7. Ensure any future interactions with Olivia are as brief and quick as possible.
8. Send Olivia a social media friend/follow request.
9. Invite Olivia to go out to eat with you.
10. Make up an excuse to avoid attending a social gathering that Olivia will also be attending.
11. Borrow an item you need from Olivia.
12. Share transportation home with Olivia after leaving Sam's place.
13. Avoid making any future plans with Olivia.
14. Let Olivia borrow an item of yours that she needs.
15. Hang out with Olivia if she invites you to hang out.
16. Ignore calls and texts from Olivia.
17. Invite Olivia to hang out with you.
18. Invite Olivia to a get-together with other friends that you are hosting.
19. Ignore an invitation from Olivia to hangout.

Appendix J: First Impressions Valence Scale

1. Based on your first meeting with Olivia, please rate how *positive or negative* your first impression of Olivia is.

1	*2*	*3*	*4*	*5*	*6*	*7*
Extremely Negative	Negative	Somewhat Negative	Neither Positive nor Negative	Somewhat Positive	Positive	Extremely Positive

2. Based on your first meeting with Olivia, please rate *how positive* of an impression you currently have of her.

1	*2*	*3*	*4*	*5*	*6*	*7*
Neutral						Extremely Positive

3. Based on your first meeting with Olivia, please rate *how negative* of an impression you currently have of her.

1	*2*	*3*	*4*	*5*	*6*	*7*
Neutral						Extremely Negative

Appendix K: Trait First Impressions Scale

Instructions: Based on your first impression of Olivia, please rate how much you agree that each trait describes Olivia.

1 – Strongly disagree
2 – Disagree
3 – Neither agree nor disagree
4 – Agree
5 – Strongly agree

1. Appropriate
2. Attractive
3. Boring
4. Caring
5. Clueless
6. Confident
7. Conscientious
8. Courageous
9. Disgusting
10. Ditsy
11. Friendly
12. Gross
13. Honest
14. Ignorant
15. Inappropriate
16. Intelligent
17. Interesting
18. Likeable
19. Negative
20. Nice
21. Obnoxious
22. Odd
23. Open
24. Poor social skills/socially unaware
25. Positive
26. Reliable
27. Rude
28. Self-Centered
29. Silly
30. Thoughtful
31. Thoughtless
32. Trustworthy
33. Unattractive
34. Unfriendly
35. Uninteresting
36. Unlikeable
37. Unreliable
38. Untrustworthy
39. Vulnerable
40. Weird

Appendix L: Friendship Measures

i) Level of Friendship Item

Instructions: There are many degrees of closeness that may exist between people. Seven of these relationships are listed below in order of closeness, with number 1 describing the most distant relationship and number 7 describing the closest relationship. Which item on the scale below ***best*** describes the type of relationship you think you would like to pursue with Olivia.

1	*2*	*3*	*4*	*5*	*6*	*7*
Stranger	Acquaintance	Casual Friend	Friend	Good Friend	Very Good Friend	Best Friend

ii) The Desire for Friendship Scale

Instructions: Individuals have many considerations when forming new friendships. Below is a list of possible ***considerations*** that one may have when making a new friend. Please rate the likelihood that you might experience this thought when considering a friendship with Olivia.

1 – Strongly disagree
2 – Disagree
3 – Neither agree nor disagree
4 – Agree
5 – Strongly agree

1. I am interested in having a friendship with Olivia.
2. I need to know more about Olivia before considering her a friend.
3. Most people would react very favourably to Olivia after meeting her.
4. It would make me uncomfortable to pursue a friendship with Olivia.
5. Olivia and I could develop a strong friendship.
6. I don't think Olivia and I would be good friends.

Appendix M: Physical Experience Item

Earlier we asked you about your emotional experience when reading about Olivia (e.g., anxiety, excitement). However, you may have also experienced physical sensations and responses, along with emotional reactions, when meeting or learning about someone new.

Sometimes, when getting to know someone new, they may share information about themselves that may trigger reflexive discomfort. We define reflexive discomfort as an uncomfortable and automatic physical reaction in response to something that may include experiencing tightening of the pelvic floor muscles, a gag reflex, tensing of leg muscles and/or abdominal muscles, shrinking and becoming small, cringing, shuddering, closing eyes/squeezing eyes shut or looking away, and raising of shoulders.

To what extent did you experience reflexive discomfort and the physical sensations described above when reading about Olivia:

0	1	2	3	4	5	6
Not at all			A moderate amount			A great deal

Alternatively, when getting to know someone new, they may share information about themselves that may trigger reflexive comfort. We define reflexive comfort as a pleasant, automatic physical reaction in response to something that may include the experience of feeling relaxed, smiling, comfortable with being close to/a desire to be closer to the stimulus, maintaining an open body orientation, reduced physical tension, and energetic.

To what extent did you experience reflexive comfort and the physical sensations described above when reading about Olivia:

0	1	2	3	4	5	6
Not at all			A moderate amount			A great deal

Briefly describe any additional details or a description of any physical responses you felt in response to Olivia. Please specify the type of sensation (e.g., tingling, feeling hot, muscle tension, relaxed) and where in the body it was felt (e.g., legs, chest). Point form is okay:

_____

_____

_____

Appendix N: Empathy Components Questionnaire (Batchelder et al., 2017)

Appendix O: The Adolescent Measure of Empathy and Sympathy (Vossen et al., 2015)

Appendix P: Familiarity Items

1. Is there someone you're close to (e.g., friend, family member, classmate, co-worker) who has a disability (e.g., physical disability, developmental disability, mental health condition, etc.)?
- ☐ Yes
- ☐ No

2. Is there someone you're close to (e.g., friend, family member, classmate, co-worker) who uses a colostomy bag?
- ☐ Yes
- ☐ No

3. Is there someone you're close to (e.g., friend, family member, classmate, co-worker) who engages in intermittent self-catheterization?
- ☐ Yes
- ☐ No

4. Do you use, or have you ever used a colostomy bag?
- ☐ Yes
- ☐ No

5. Do you engage in, or have you ever engaged in intermittent self-catheterization?
- ☐ Yes
- ☐ No

6. Please select the option that best describes your level of knowledge and familiarity with intermittent self-catheterization prior to participating in this study.
- ☐ No familiarity or knowledge
- ☐ Some familiarity or knowledge
- ☐ A moderate amount of familiarity or knowledge
- ☐ A great deal of familiarity or knowledge

7. Have you received any formal education or training regarding intermittent self-catheterization?
- ☐ Yes
- ☐ No
- ☐ Not sure

8. Please select the option that best describes your level of knowledge and familiarity with colostomy bags prior to participating in this study.
- ☐ No familiarity or knowledge
- ☐ Some familiarity or knowledge
- ☐ A moderate amount of familiarity or knowledge
- ☐ A great deal of familiarity or knowledge

9. Have you received any formal education or training regarding colostomy bags?
   - ☐ Yes
   - ☐ No
   - ☐ Not sure

Appendix Q: Instructed Response Items

1. (Embedded after demographics) For data checking purposes, please choose option 5, Slightly agree, for this item.
- ☐ Strongly disagree
- ☐ Disagree
- ☐ Slightly disagree
- ☐ Neither agree nor disagree
- ☐ Slightly agree
- ☐ Agree
- ☐ Strongly agree

2. (Embedded within first set of Marlowe-Crowne Social Desirability Scale-Short Form items) Please select 'True' for this item to assist the researchers of this study in data checking.
- ☐ True
- ☐ False

3. (Embedded within Perceptions of New Friends Cognitions subscale) For data checking purposes, please choose option 2, Unlikely, for this item. IRI3
- ☐ Extremely Unlikely
- ☐ Unlikely
- ☐ Neutral
- ☐ Likely
- ☐ Extremely Likely

4. (Embedded within Perceptions of New Friends After Behaviours subscale) For data checking purposes, please choose option 4, Likely, for this item. IRI4
- ☐ Extremely Unlikely
- ☐ Unlikely
- ☐ Neutral
- ☐ Likely
- ☐ Extremely Likely

5. (Embedded within the Trait First Impressions Scale) Please select option 2 'Disagree' for this item to assist the researchers of this study in data checking.
- ☐ Strongly disagree
- ☐ Disagree
- ☐ Neither agree nor disagree
- ☐ Agree
- ☐ Strongly agree

6. (Embedded before Empathy Components Questionnaire) Please select option 1 'Strongly disagree' for this item to assist the researchers of this study in data checking.
- ☐ Strongly disagree
- ☐ Disagree
- ☐ Agree

- ☐ Strongly Agree

7. (Embedded within The Adolescent Measure of Empathy and Sympathy) For data checking purposes, please choose option 4, Often, for this item.
   - ☐ Never
   - ☐ Almost never
   - ☐ Sometimes
   - ☐ Often
   - ☐ Always

8. (Embedded within Familiarity Items) Please select option 2 ‘No’ for this item to assist the researchers of this study in data checking.
   - ☐ Yes
   - ☐ No
   - ☐ Not sure

Appendix R: Information Letter & Consent Form

Faculty of Health and Behavioural Sciences
Department of Psychology

Title of Project: **Factors Affecting Perceptions of New Friends Study**

Principal Investigator: Dr. Kirsten Oinonen, Ph.D., C. Psych
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Student Co-Investigator: Claudia J. Czechowski, HBSc
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Information Letter & Consent

Dear Potential Participant,

You are invited to take part in a research study entitled "Perceptions of New Friends". This study is being conducted by Claudia J. Czechowski, an MSc Psychological Science student in the Health Hormones and Behaviours Laboratory (HHABLAB) in the Department of Psychology at Lakehead University, and is supervised by Dr. Kirsten Oinonen, a faculty member in the Department of Psychology at Lakehead University.

Please read this letter carefully to understand what is involved in this study before deciding whether you would like to participate.

What is this research about?

The main purpose of this study is to identify factors that contribute to how individuals view new acquaintances and how these appraisals inform friendship potential.

How long will the study take to complete?

This study should take no longer than 45-60 minutes to complete. The survey is administered in an online format using the SurveyMonkey platform. You may complete the survey at a location and time of your choosing.

Are there any risks or benefits I should be aware of?

Although some of the questions in the survey ask about sensitive subject matter, there are no known risks associated with participation, as the probability and magnitude of harm or discomfort experienced while participating is no greater than what is ordinarily encountered on a daily basis.

Potential benefits of participating in this research project involve a better understanding of the process of psychological research and research methods, an opportunity to contribute to scientific research, and possible benefits from personal insight.

As a thank you for your time and participation in this research, you can sign up to receive one bonus mark towards an eligible Lakehead University psychology course if taking such a course. You may also choose to be entered into a draw for a chance to win one of three $50 (CDN) electronic gift cards from GiftCards.ca.

Is the study anonymous?

All data collected in this study is anonymous and no identifying information will be collected within the study. Your email address is requested to contact you should you win an electronic gift card, but it is not connected to your data, and will not be given out to any third parties.

As per university requirements, the anonymous data will be stored securely for at least seven years by Dr. Oinonen at Lakehead University. Only approved members of the HHABLAB will be given access to anonymized data. Should the data be requested for meta-analyses, or if the publication of a paper requires the data to be posted in a repository, only a dataset where every effort was made to remove indirect identifiers (i.e., a unique combination of age and gender) will be shared.

Please note that the online survey tool used in the study, (Survey Monkey), is hosted by a server located in the USA. The US Patriot Act permits U.S. law enforcement officials, for the purpose of anti-terrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this, we cannot absolutely guarantee the full confidentiality and anonymity of your data. With your consent to participate in this study, you acknowledge this.

Do I have the right to decline to answer any questions?

Taking part in this study is entirely voluntary, and you may refuse to participate in any part of the study, decline to answer any question, or withdraw from the study at any point up until data submission without explanation or penalty. Once your data is submitted, it cannot be withdrawn due to being anonymized.

What will the study data be used for after it is collected?

Participant responses will be used to complete the thesis of the student co-investigator, Claudia J. Czechowski and to examine related exploratory research questions within the lab. Study findings will be used for research publications and/or presentations at conferences. Given that your identity cannot be connected to any data, all results are anonymous.

Can I see the study results?

A detailed summary of the results and research findings can be made available to you upon completion of the study. It may take up to 1 year from the time of your participation before the study findings are available. If you are interested in receiving a summary of the results once the study has been completed, please email the Student Investigator, Claudia Czechowski, at czechowskic@lakeheadu.ca with the subject heading "Friendship Study Results Summary Request". This information will not be linked to your survey responses.

Whom do I contact if I have any questions about the study?

Any questions about the study will be answered over the course of the experiment (other than specific questions about the hypotheses). Please direct any questions you may have to the Student Co-Investigator, Claudia J. Czechowski at cczechow@lakeheadu.ca.

Ethics Information:

This study has been approved by the Lakehead University Research Ethics Board. If you have any questions or concerns related to this study or your rights as a research participant, please contact Sue Wright from the Lakehead University Research Ethics Board at (807) 343-8283 or research@lakeheadu.ca. Members of the Research Ethics Board oversee the ethical conduct of research studies are not part of the study team. Anything discussed with them will be kept confidential.

Thank you for your interest and participation in this study. We greatly appreciate your contribution to our research.

MY CONSENT:

I have read the information letter and I agree to the following:

- I have read and understand the information contained in the information letter.
- I agree to participate in this study.
- I understand the purpose of this research, its risks and benefits.
- I understand that my participation in this study will bring minimal risks or harm.
- I understand that my participation in this study is voluntary and that I may withdraw at any time up until data analysis for any reason without penalty.
- I understand that there is no obligation to answer any questions that I feel are invasive, offensive, or inappropriate.

- I understand that the information I provide will be anonymous and cannot be attributed to myself.
- In the future, anonymized data may be shared with other researchers or posted in online repositories for the purpose of conducting future research or for peer review.
- I understand that the data will be securely stored at Lakehead University for at least seven years following the completion of the research project.
- I understand the research findings will be available to me upon request.
- I understand that by consenting to participate, I do not waive any rights to legal recourse in the event of research-related harm.
- All of my questions related to the study have been answered.

I have read and agree to the above information, I am at least 16 years of age, and by completing and submitting this study agree to participate.

If you consent to participate in this study, please press "*Next*" at the bottom of the page to continue.

Appendix S: Debriefing Form

Faculty of Health and Behavioural Sciences
Department of Psychology

Title of Project: **Factors Affecting Perceptions of New Friends Study**

Principal Investigator: Dr. Kirsten Oinonen, Ph.D., C. Psych
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Debriefing Form
Please print this page for your own records

Thank you for your participation in our study, we greatly appreciate you taking the time to help us with our research.

The purpose of this study is to investigate whether the Behavioural Immune System (BIS) affects how people think about individuals with invisible disabilities. This system helps us act in a way that prevents physical contact with germs and things that could make us sick by making individuals feel disgust and think carefully about the potential risks of infection. But sometimes, our brain confuses harmless non-contagious features that are similar to contagious things as being dangerous. This confusion may partly explain why people with disabilities are sometimes treated poorly and discriminated against.

Additionally, there is evidence that how much we care about others (empathy) might affect how much disgust we feel and how we see others. Existing research also shows that telling others about having a disability (disclosure) affects how relationships grow. As such, we are examining how empathy and disability disclosure changes how we judge unfamiliar others with vs. without a disability.

Learning about what makes the BIS react and how people feel (e.g., disgust, empathy) when they see/meet someone with a disability may better help and inform policies and interventions aimed at reducing negative ideas about disability. Please see the references below if you are interested in reading more about BIS and disability-related research.

Information about study results:
Please do not share research procedures and/or the study purpose with others who may participate in the future. Knowledge of specific predictions may influence participant responses, compromising the collected data and results of the study.

As mentioned in the consent form, if you are interested in receiving a summary of the results once the study has been completed, please email the Student Investigator, Claudia Czechowski, at czechowskic@lakeheadu.ca with the subject heading "Friendship Study Results Summary Request". You will receive an emailed copy of the Results Summary once it is available. It may take up to 1 year from the time of your participation before the study findings are available.

Bonus Marks and Gift Card Draw:
As a thank you for your time and participation in this research, you can sign up to receive one bonus mark towards an eligible Lakehead University psychology course. You may also choose to be entered into a draw for a chance to win one of three $50 (CDN) electronic gift cards from GiftCards.ca. If you would like to be entered into the gift card draw, please click on the link below. If you choose to not enter the draw, please click "DONE" to exit the survey.

Mental Health Resources:
Sometimes people can feel upset when thinking about their mood and personality. If completing this survey has raised any concerns about your mental health or you found that some questions or aspects of the study were distressing and you would like to speak with a mental health practitioner, please consider the resources below:

Lakehead University Student Health & Wellness: 1-807-343-8361 (Thunder Bay)
1-705-330-4008 ext. 2116 (Orillia)
Thunder Bay Crisis Response (24 hours): 807-346-8282 or 1-888-269-3100
Hope for Wellness Help Line (for Indigenous peoples across Canada): 1-855-242-3310
Canadian Mental Health Association: 416-646-5557

References:

Below are some references should you be interested in reading more about research related to the study that you just participated in:

Schaller, M. (2011). The behavioural immune system and the psychology of human sociality. *Philosophical Transactions of the Royal Society B: Biological Sciences, 366*, 3418–3426. https://doi.org/10.1098/rstb.2011.0029

Steinkopf, L. (2017). Disgust, empathy, and care of the sick: An evolutionary perspective. *Evolutionary Psychological Science, 3*, 149-158. https://doi.org/10.1007/s40806-016-0078-0

Thank you for your participation!

Click HERE to enter your email for the gift card draw.

Clicking the above link will direct you to a new page that is not connected to survey responses and results. The email you provide for the gift card draw will not be associated with your survey responses, which will remain anonymous.

(On a separate window)

Gift Card Draw:

If you would like to be entered into the draw for a chance to win one of three $50 (CAD) electronic gift cards from GiftCards.ca, please provide your email address below. Should you win, we will use this email address to contact you and send you the electronic gift card.

Email:_____

Thank you for your time and participating in this study!

Appendix T: Supplementary Analysis – Partial Correlations

Hypothesis 1: Correlations and Partial Correlations Between the Negative Perceptions Composite Score and Variables Related to Behavioural Immune System (BIS) Activation when Controlling for Social Desirability

Predictors	Negative Perceptions Composite Score (n = 213)
Disgust Propensity	.16* (.12)
Disgust Sensitivity	.16* (.15*)
Pathogen Disgust	.14* (.13)

Note. Values in the brackets represent partial correlations controlling for social desirability.

$^{t}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$. (^{t} = trend).

Appendix U: Supplementary Analysis – Control Regression

Results for a third supplementary regression are detailed in the table below. For this regression we examined whether empathy and sympathy predicted negative perceptions among control participants (i.e., those exposed to the control woman who did not disclose ISC), and whether BIS activation added to the prediction of negative perceptions beyond any variance accounted for by empathy and sympathy. Variables were entered in three blocks: a) block 1 included social desirability as a covariate; b) block 2 included empathy and sympathy; and c) block three included relevant BIS activation measures. The model for the first step significantly predicted negative perceptions [$F(1, 100) = 4.28$, $p = .041$]. Social desirability was a significant unique predictor in this model ($\beta = -.20$, $p = .041$, $sr^2 = -.20$). On the second step, empathy and sympathy added significantly to the prediction of negative perceptions [R^2 change = .154, $F(2, 98) = 9.35$, $p < .001$]. In this model, empathy emerged as a robust significant unique predictor ($\beta = -.44$, $p < .001$, $sr^2 = -.40$), whereas social desirability was no longer a significant unique predictor ($\beta = -.15$, $p = .117$, $sr^2 = -.16$). The overall model explained 17% ($R^2_{Adjusted}$) of the variance and was significant [$R^2 = .195$, $F(3, 98) = 7.90$, $p < .001$]. On the third step the addition of BIS activation, disgust propensity, disgust sensitivity, and pathogen disgust did not add significantly to the prediction of negative perceptions [R^2 change = .033, $F(3, 95) = 1.37$, $p = .257$]. In the overall model, empathy remained as the only strong unique predictor ($\beta = -.44$, $p < .001$, $sr^2 = -.41$). The final model with the seven predictors significantly explained 18% ($R^2_{Adjusted}$) of the variance and was significant [$R^2 = .228$, $F(6, 95) = 4.68$, $p < .001$]. In summary, empathy emerged as the primary contributor to the variance in negative perceptions among control participants not exposed to a target disclosing ISC. Disgust-related variables (BIS activation) did not significantly predict negative perceptions among controls.

Hypothesis 1: Hierarchical Regression Examining Predictors of Negative Perceptions Among Control Participants: Behavioural Immune System (BIS) Activation, Empathy, and Sympathy

	Negative Perceptions Composite Score											
		Step 1		Step 2		Step 3						
Predictors	ΔR^2	β	sr^2	β	sr^2	β	sr^2	R^2	$R^2_{Adjusted}$	*F Change*	*F*	*N*
Step 1	.04*							.04	.03		4.28*	100
Social Desirability		-.20*	-.18*	-.14	-.16	-.10	-.11					
Step 2	.15***							.20	.17	9.35***	7.90***	98
Empathy				-.53***	-.45***	-.52***	-.45***					
Sympathy				.02	.02	-.02	-.02					
Step 3	.03							.33	.31	1.37	4.68***	95
Disgust Propensity						.03	.02					
Disgust Sensitivity						.16*	.15*					
Pathogen Disgust						.02	.02					

Note. Dotted lines are used in the table to separate the variables entered together as blocks within the different steps of the regression model. The cumulative empathy score from the Empathy Components Questionnaire, and mean sympathy scores from the Adolescent Measure of Empathy and Sympathy were used. ISC = Intermittent Self-Catheterization.

$^{t}p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. (^{t} = trend)

Appendix V: Supplementary Analysis – Internal Consistency of Receptivity to New Friends Scale

Cronbach's Alphas for Receptivity to New Friends Scale (Whole Scale and Subscales)

Scale/Subscale	N	Items	Cronbach's α
Whole Scale	439	75	.96
All Negative Items	439	35	.93
Negative Affect	439	9	.86
Negative Cognitions	439	10	.80
Negative Behaviours	439	16	.92
All Positive Items	439	40	.92
Positive Affect	439	10	.80
Positive Cognitions	439	9	.77
Positive Behaviours	439	21	.92

Appendix W: Supplementary Analysis – Internal Consistency of Measures

Cronbach's Alphas for Friendship Measures Used in the Current Study: Behavioural Immune System Activation, Desire for Friendship, Empathy, Sympathy, Familiarity with Disability, Social Desirability, and Infrequent Responding

Scale/Subscale	N	Items	Cronbach's α
Perceived Vulnerability to Disease – Whole	437	15	.83
Germ Aversion – PVD*	438	8	.76
Perceived Infectibility – PVD*	438	7	.89
Disgust Propensity & Sensitivity Scale	436	12	.87
Disgust Propensity – DPSS*	438	6	.81
Disgust Sensitivity – DPSS*	437	6	.80
Pathogen Disgust – TDDS*	437	7	.77
Desire for Friendship Scale – Whole*	436	6	.68
Desire for Friendship Scale – Negative	436	3	.44
Desire for Friendship Scale – Positive	439	3	.57
Empathy Components Questionnaire – Whole*	426	27	.86
Cognitive Ability – ECQ	437	6	.59
Cognitive Drive – ECQ	434	5	.60
Affective Ability – ECQ	433	5	.65
Affective Drive – ECQ	437	4	.70
Affective Reactivity – ECQ	436	7	.65
Adolescent Measure of Empathy & Sympathy – Whole	434	12	.78
Affective Empathy – AMES	437	4	.75
Cognitive Empathy – AMES	437	4	.82
Sympathy – AMES*	437	4	.70

Social Desirability*	438	13	.72

Note. Scales with an asterisk were used in study analyses. Scales above the dotted line were used to measure behavioural immune system activation. PVD = Perceived Vulnerability to Disease Scale; DPSS = Disgust Propensity and Sensitivity Scale; TDDS = Three Domains of Disgust Scale; ECQ = Empathy Components Questionnaire; AMES = The Adolescent Measure of Empathy and Sympathy.