

**EMPATHY DEVELOPMENT FROM CHILDHOOD TO ADOLESCENCE PREDICTS  
COVID-19 HEALTH GUIDELINE ADHERENCE IN YOUNG ADULTHOOD**

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## Abstract

The COVID-19 pandemic launched global public health campaigns designed to inform the public and enforce strategies aimed at curbing the virus's rapid spread. These campaigns required individuals to act not only in self-interest but also in consideration of others. Personality traits such as empathy may shape how such strategies are perceived and, consequently, whether they are followed. To gain insights into how personality may influence adherence to COVID-19 mitigation strategies, trajectories of empathy from ages 11 to 16 were used to predict the likelihood of following public health recommendations such as hand washing, cancelling travel, avoiding crowds, taking care of cleanliness, and avoiding public places at age 23 when the first year of the COVID-19 pandemic took place. The role of gender was also explored, given well-documented differences in empathy and compliance with public health guidelines. Participants ( $N = 361$ ) completed annual self-report measures of empathy from ages 11 to 16 and later reported on their COVID-19 preventative behaviour at age 23. As expected, most participants followed a moderate increasing empathy trajectory (53.5%), followed by a high increasing trajectory (33.5%), and a low stable trajectory (13%). Gender significantly predicted adherence, with women reporting greater compliance than men. Additionally, individuals in the high increasing empathy group reported more adherence than those in the low stable group. However, when gender was accounted for, empathy trajectories no longer significantly predicted adherence. A marginally significant interaction between gender and empathy trajectory emerged: among men, those with higher empathy in childhood and adolescence reported greater adherence to COVID-19 guidelines than those with moderate or lower levels of empathy. These findings underscore the value of fostering empathy in childhood and adolescence and suggest that promoting empathy may enhance future public health compliance, particularly among men.

## Introduction

The World Health Organization (WHO) declared the novel corona virus (COVID-19) outbreak a pandemic on March 11, 2020 (WHO, 2020). Shortly after, all Canadian provinces and territories declared at least a state of public health emergency to which the enforcement of self-isolation measures, gathering restrictions, and penalties for non-compliance ensued to varying degrees depending on the province (Urrutia et al., 2021). These measures evolved with time and created numerous challenges in terms of health communication and fostering public cooperation to mitigate the spread of the virus. By May 20, 2020, wearing a mask was recommended in all public spaces in the province of Ontario along with social distancing (Office of the Premier, 2020). A popular phrase to encourage public participation in preventative measures was to encourage residents to "flatten the curve" to help curb the infection to not overwhelm the healthcare system. Thus, a heavy focus of public health messaging during COVID-19 was onboarding people to think and act on behalf of the safety of others – a facet of prosocial behaviour.

Prosocial behaviour is characterized by voluntary and intentional actions that aim to benefit others (Padilla-Walker & Carlo, 2015), and is often primarily motivated by empathy (Batson, 2011; Davis, 2015; Decety et al., 2016). Empathy is the ability to understand and experience the perspective and feelings of others. Adhering to COVID-19 preventive measures such as social distancing and wearing a mask can be viewed as prosocial acts (Pfatteicher et al., 2020), in terms of one sacrificing certain comforts and obligations for the overall good of the group (Galang et al., 2021). A way to promote prosocial behaviour and encourage empathy during a pandemic is through public health messages that strategically frame COVID-19 information and underscore the collective duty to protect both oneself and others. In my thesis, I examined how trajectories of empathy in childhood contribute to health-related decisions (e.g., social distancing and hygiene practices) during the COVID-19 pandemic. One fundamental miss during the COVID-19 pandemic was the underinvestment in behavioural sciences to inform public health policies (Collins, 2024). This research helps provide insight into individuals' behaviour during a pandemic crisis and inform the importance of empathy interventions during childhood and adolescence.

## Literature Review

### Framing of Public Health Messaging

An essential element for curbing the spread of COVID-19 is relaying information and health guidelines to the public in hopes of promoting preventative behaviour. Having a higher level of understanding of COVID-19 information has been linked to a higher adherence trajectory to preventative measures (Courdi et al., 2023). Later in the pandemic, however, being informed of new COVID-19 variants did not in itself motivate people to follow health advice (Petersen et al., 2022), thus, another purpose of public health messaging is to target people's emotional responses to encourage individual behaviour change. Existing research is not straightforward when outlining the pathway through which emotional responses lead to the most significant change. A collection of studies by Jordan et al. (2021) indicates that emphasizing the public benefits of prevention and prosocial behaviour increases prevention intentions. However, Heffner et al. (2021) found that both threat and prosocial messages were equally effective in stimulating willingness to engage in self-reported social distancing. The basis of the emotional responses differed between the messages. Threat messages created a stronger emotional response, but the efficacy of the threat intervention depended less on the strength compared to the prosocial intervention. The prosocial message was more effective at increasing participants' willingness to self-isolate if it produced a strong, positive, and arousing emotional response (Heffner et al., 2021). In other words, threat messages were a quick and effective way to create behavioural change through negative emotions, while prosocial messages only worked if they engaged participants to have a strong positive emotional response.

Other researchers have investigated the impacts of negative emotional arousal from public health messages to help determine if this is the best course of action for encouraging health behaviour and individuals' well-being. One study labeled these two types of framings in terms of potential losses or potential gains (Dorison et al., 2022). Specifically, Dorison et al. (2022) collected data from 84 countries to examine how these framings would compare in increasing participants' anxiety. Participants were randomly assigned to read COVID-19 health recommendations (e.g., social distancing and wearing a mask) that were framed in terms of losses (e.g., if you do not follow, you can endanger yourself and others) or gains (e.g., if you do follow, you can protect yourself and others). Following the message framing manipulation,

behavioural intentions to follow COVID-19 preventative guidelines, attitudes toward COVID-19 prevention policies, whether participants chose to see more information about COVID-19, and self-reported anxiety were measured. Dorison et al.'s findings indicated that loss versus gain framed messages had minimal impact on behavioural intentions, policy attitudes, or information seeking, but there was an increase in participants anxiety for loss framed messages. These findings are similar to Heffner et al.'s (2021) who found that negatively framed messages did not differ from positive messages in terms of behavioural change, but the valence of the messages significantly increased negative emotional arousal. Considering that anxiety symptoms generally increased over the pandemic already (Hawes et al., 2022; Krygsman et al., 2023), and because heightened anxiety was associated with diminished coping and quality of life during the pandemic (Shamblaw et al., 2021), policy makers should be mindful of the potential long-term effects of loss or threat framing on mental health. The mental health of Canadians must be considered in the framing of public health messages as it can negatively impact individuals' perceived self-efficacy in following COVID-19 preventative measures.

Like threat or loss-framed public health messages, Legate and Weinstein (2022) examined two different motivation styles of messaging: autonomous motivation (self-endorsed and volitional) and controlled motivation (driven by internal or external pressure or coercion). These motivation styles derive from Self-Determination Theory (Ryan & Deci, 2000, 2017) which proposes that socialized behaviour, including health behaviour, are often encouraged by controlled motivation that mostly includes influence by others. Using a longitudinal design, they tested how aspects of these motivation styles shaped participants' drive to stay at home over a 2-month period. Results indicated that messages received from governmental and health organizations between March and May 2020 were higher in autonomous motivation, and that in general, adults were more motivated to stay home due to their own concerns and public health measures than because of felt pressure and coercion. Specifically, perceiving stay at home messages as autonomy-supportive and mandated predicted spending more time at home while perceiving those messages as controlling predicted spending less time at home (Legate & Weinstein, 2022). Although stay-at-home mandates were not voluntary, allowing the individual to identify with the message encouraged adherence to mandates compared to more controlling language. Thus, threatening (Heffner et al., 2021), controlling (Legate & Weinstein, 2022), and

loss (Dorison et al., 2022) framed messages do not appear to benefit the adherence to preventive measures or well-being of individuals during the COVID-19 pandemic.

Ultimately, public health messaging can help determine how at-risk people feel about contracting the virus and their self-efficacy in taking preventative action against contracting COVID-19. Bavel et al. (2020) have argued that emotions often drive risk perceptions and negative framing works well for capturing attention, but fear can lead to defenseless reactions without feeling a sense of efficacy. That is, negatively framed messages can leave some people fearful of the virus without giving them a sense of how to protect themselves, and without believing that restrictions work or believing they can protect themselves people will be less motivated to follow them. Continuing with the effect of anxiety on adherence to COVID-19 preventative measures, Eichenberg et al. (2021) identified four groups that varied based on perceived susceptibility and engagement in COVID-19 health-promoting behaviour in a German and Austrian population survey. The groups were formed based on dichotomization using the arithmetic mean of the scales perceived susceptibility ( $M = 8.72$ ) and engagement in health-promoting behaviour ( $M = 10.48$ ). The purpose of the groups was to demonstrate how different types of public health messaging can be altered to the varying reactions to the COVID-19 pandemic. Group 1 ( $n = 450$ ), showed a reduced engagement with protective measures and exhibited underestimation of the COVID-19 pandemic, group 2 ( $n = 984$ ) showed many positive personality variables and high compliance with protective measures, group 3 ( $n = 468$ ) perceived the subjective risk of disease high, but high emotional discomfort and stress caused by the protective measures led to the activation of a fear defense, and group 4 ( $n = 1004$ ) was highly anxious and therefore compliant. The two largest groups, group 2 and group 4, highlight how anxiety and coping skills prior to the pandemic influence how protective measures are perceived. Although group 4 was compliant, Eichenberg et al. (2021) suggests that this group's lack of personal resources led to increased anxiety and more negative stress processing strategies. This implies that coping styles and risk perceptions during the pandemic are influenced by personal factors.

### **Personality Traits and Adherence to COVID-19 Measures**

Previous pandemics also saw public health campaigns, like during the H1N1 pandemic in 2009, which was first detected in Mexico and quickly spread worldwide (IPAC Canada, 2014).

Early research into the H1N1 pandemic suggests that demographics, perceived susceptibility, perceived severity of the disease, greater belief in the effectiveness of recommended protective behaviour, and greater trust in authorities were associated with a higher chance of adopting protective behaviour (Bish & Michie, 2010). Researchers have been consistent in determining which demographics are less likely to adhere to COVID-19 preventative measures. Across three Canadian studies, it was found that men, younger age groups, those with lower education, and those in the paid workforce had less confidence in their ability to comply with government mandates (Brankston et al., 2021, Dharma & Bondy, 2023, Mourali et al., 2023). Personality traits, as conceptualized by various theoretical frameworks such as the Big Five (Goldberg, 1993) and HEXACO models (Ashton & Lee, 2007), played a pivotal role in shaping an individual's emotional and behavioural (including health behaviour; Raynor & Levine, 2009) responses to external stressors (Leger et al., 2016; Xin et al., 2017). Coping strategies have been defined as continuously varying cognitive and behavioural attempts to handle certain stresses that go past the current resources of an individual (Lazarus & Folkman, 1984). Thus, a deeper understanding of the interaction between personality traits and coping styles can be informative, particularly regarding those who are faring better during the pandemic and are therefore better equipped to adhere to COVID-19 preventative measures.

For instance, Weiß et al. (2022) found that of the Big Five traits, higher conscientiousness (a personality factor that includes traits like diligence and organization) resulted in better coping with contact restrictions, while those higher in extraversion coped better during the time where contact restrictions were lifted. Notably, neuroticism (a factor associated with emotional instability and anxiety) was associated with poor coping and negative affect at all time points. Interestingly, Götz et al. (2021), found in a large data sample consisting of 101,005 participants from 55 countries that neuroticism along with conscientiousness and agreeableness positively predicted sheltering in place (i.e., staying home) compared to individuals reporting lower in those traits and higher in extraversion. In another large sample (N=34,629) from European countries, Airaksinen et al. (2021) found that openness (described by traits like creativity, open-mindedness, and imaginative), conscientiousness, and neuroticism were most consistently associated with precautionary behaviour during the pandemic. These findings of neuroticism being related to poor coping but high compliance on preventative measures echo the

point Heffner et al. (2021) make regarding anxiety being effective for adherence but is not indicative of healthy coping during the pandemic.

In a smaller Polish sample ( $N=263$ ), only agreeableness (a personality factor associated with cooperation, empathy, and compassion) was associated with greater compliance among the Big Five traits (Zajenkowski et al., 2020). When comparing two of the Big 5 personality traits to each other, higher scores of conscientiousness were associated with following stay-at-home measures, whereas higher scores on extroversion were associated with lower means for social distancing (Carvalho et al., 2020). These findings point toward conscientiousness, openness, and agreeableness personality traits being associated with greater compliance to COVID-19 preventative measures. Although neuroticism has also been associated with greater compliance, it is exempted from this list since it has been related to poor coping (Weiß et al., 2022). However, not all studies have consistently linked all three of these traits to adherence rates. There are many possibilities as to why these studies had different results. This might be explained by differing sample sizes, how preventative measures were defined (e.g., masking or social distancing), or the variety of populations used in each study. Particularly, the time points during the pandemic when data were collected can influence results, as people were more equipped to adhere with preventative measures at the beginning of the pandemic but became fatigued to the measures over time (Petherick et al., 2021).

Volk et al. (2021) considered another approach to examining personality traits and adherence by investigating direct and indirect links between demographics, personality, and COVID-19 coping responses. Personality was measured using the HEXACO model among young adults (ages 24–35) and results indicated that emotionality (E), extraversion (X), and conscientiousness (C) were associated with more adaptive COVID-19 coping responses. Specifically, having higher E and X were associated with higher levels of seeking socioemotional support, and higher E and C were associated with engaging in higher problem-solving strategies. HEXACO's emotionality factor is like neuroticism from the Big Five Personality traits as, both describe a tendency to experience emotions such as anxiety, fear, and emotional instability. Therefore, these findings contrast previous data that suggest neuroticism is associated with poorer coping (Weiß et al., 2022). Volk et al. relate this novel finding to previous ties between E and attachment-seeking behaviour which promotes seeking reassurance from

family and friends. Thus, in the context of this study, neurotic traits led individuals to seek help from others which assisted in healthier coping. Ultimately, Volk et al.'s results suggest that a personality profile of being socially involved, socially sensitive, and thoughtful/careful are positively associated with healthier responses to COVID-19 coping responses. Like the Big Five personality model, agreeableness in the HEXACO model was related to patience, tolerance, forgiveness, and empathy, yet Volk et al. did not find direct associations between agreeableness and COVID-19 responses. Understandably, patience and empathy toward others seem like positive traits that would predict compliance with measures that help the individual and others. The authors note that their data were collected at the height of the initial North American lock down, and that most participants may have reacted to the unprecedented conditions with patience regardless of their underlying agreeableness (Volk et al., 2021). Nonetheless, Volk et al. encouraged further investigation into how a trait factor like agreeableness would persist over the course of the pandemic.

Most studies on trait agreeableness during the pandemic have been cross-sectional, therefore, only a snapshot of the effects personality traits have on adhering to preventative measures has been examined. With this in mind, researchers have associated the personality trait of agreeableness with higher adherence at the beginning of the pandemic (Götz et al., 2021; Zajenkowski et al., 2020). Agreeable individuals tend to comply with governmental recommendations to combat the spread of COVID-19, while those who are less emotionally stable are more fearful (Asselmann et al., 2020). Individuals higher on agreeableness can more effectively internalize the importance and value of preventative guidelines as a function of their concerns about the well-being of their communities and therefore engaged in more social distancing (Moore et al., 2022). Particularly, women score higher than men on agreeableness and conscientiousness and are more willing to comply to safety measures (Otterbring & Festila, 2022). To explain these findings, agreeable people care about others and are generally prosocial in nature (Wilkowski et al., 2006). Given that social distancing and masking can be viewed as prosocial acts (Pfatteicher et al., 2020), and that prosocial messaging can effectively encourage the willingness to engage in preventative measures (Heffner et al., 2021), it is worthwhile to explore the role trait empathy has in adhering to COVID-19 safety measures.

## **Empathy and Adherence to COVID-19 Measures**

As with any multidimensional construct, keeping the measurement of empathy consistent across research is challenging. Nonetheless, empathy's role in prosocial behaviour is robust in the literature. Empathy is defined as perspective taking (cognitive empathy; the tendency to consider another's point of view) and empathic concern (emotional empathy; feelings of compassion for others; Davis, 1980, 1983). Empathic concern has been associated with feeling responsible for others and a desire to improve others' condition (Paciello et al., 2013; Stocks et al., 2009) and has been shown to translate to health behaviour. For example, prior to the pandemic, empathy has been associated with fostering hygiene practices in healthcare workers, such as hand washing (Sassenrath, 2016). During the pandemic, Dinić et al. (2021) found that empathy toward people in forced isolation related to compliance with COVID-19 protective behaviour. Specifically, empathy acted as a mediator in the positive relation between the prosocial tendency to help anonymously and engage in protective behaviour. Empathy also weakened the negative effect of selfishness on compliance as more selfish people were less likely to comply (Dinić et al., 2021).

Pfattereicher et al. (2020) investigated the possibility of empathy being a motivator for adherence across four studies with samples from the United States, the United Kingdom (UK), and Germany. The activation of empathy resulting in others accepting the personal cost of wearing a mask or practicing physical distancing were tested. In studies 1 and 2, participants were surveyed on their empathy for people most vulnerable to the virus and their physical-distancing practices. The third study included an experimental manipulation where each participant was randomly assigned to one of three conditions: the information only condition, the information and empathy condition, or the control condition. The difference between the information-only condition and the information-plus-empathy condition was the addition of a one-minute video that evoked high levels of affective empathy in a prior independent study. The fourth study included the same three experimental conditions as study 3, but also measured motivation to wear a mask, participants' objective and subjective vulnerability to the virus, and acceptance to mask policies. The findings suggest that empathy for people most vulnerable to the virus represents an emotional basis regarding wearing a face mask and adhering to physical distancing (Pfattereicher et al., 2020). Specifically, results of studies 1 and 2 indicated that

empathy was related to physical distancing and these results carried over to studies 3 and 4 where the motivation to adhere to physical distancing only increased significantly in the information and empathy condition compared to the control condition. The results from study 4 showed that the motivation to wear a mask was significantly higher in the empathy condition compared to the control and information-only conditions (Pfatteicher et al., 2020). Although empathy in these studies was in the context of empathy toward those forced in isolation (compared to trait empathy), these results are indicative of further findings for empathy's relationship to adherence.

For instance, Galang et al. (2021) used the social distancing measure Pfatteicher et al. (2020) created for their studies and the Interpersonal Reactivity Index when they investigated the relation between empathy and self-reported social distancing tendencies during COVID-19. Galang et al.'s (2021) findings corroborate results by Pfatteicher et al. (2020) in that empathic concern and perspective taking positively correlated with social distancing while personal distress did not, suggesting that emphasizing distress during a time of crisis might not be an effective approach to promote distancing policies. Additionally, Carvalho et al. (2022) surveyed 814 Brazilian adults in March 2020, when Brazil was in the first stages of the pandemic, to explore whether personality traits account for differences in adherence to COVID-19 preventative measures. Their results indicated that the higher the individual scored on empathy, the more likely they would be committed to hygienic recommendations, following experts' and leaders' guidance, taking pleasure in spending more time at home, and being concerned about others contracting COVID-19 (Carvalho et al., 2022). These results suggest that empathic individuals may have an attitude that is more compatible with following COVID-19 health recommendations. Between March 18 and May 23, 2020, Morstead et al. (2022) had 2,841 participants complete a baseline survey and then a follow-up survey two weeks later to assess physical distancing and hygiene practices. Higher trait empathy and feeling personally threatened by COVID-19 were associated with greater engagement in preventative measures. However, for individuals who perceived COVID-19 as less personally threatening, high levels of empathic responding were associated with a higher likelihood of engaging in preventative behaviour (Morstead et al., 2022). Interestingly, Wright and Fancourt (2021) collected data weekly over the first five months of lockdown in the UK and found that individuals with higher levels of empathy were more likely to comply with COVID-19 restrictions in later months. Therefore, being more

empathic appears to be associated with a personality type that is more aligned with following preventative measures and tolerating those measures over time.

In contrast, low trait empathy has been associated with lower adherence to COVID-19 preventative measures. For example, 893 adult participants completed a web-based questionnaire that included items about adherence to COVID-19 containment measures (e.g., social distancing, masking, hygiene), facets of the Personality Inventory for DSM-5, which assesses pathological personality traits, and the Affective and Cognitive Measure of Empathy, which evaluates trait empathy (Carvalho & Machado, 2020). The results showed that people with increased psychopathy traits and low levels of empathy tended to adhere less to containment measures compared to participants not showing these traits (Carvalho & Machado, 2020). Similarly, Miguel et al. (2021) conducted a survey with 1578 adults using the same measures as Carvalho and Machado (2020) and found significant differences between the antisocial and empathy groups. Specifically, they found that lower levels of empathy and higher levels of callousness, deceitfulness, and risk-taking, were directly associated with lower adherence with containment measures (Miguel et al., 2021). These findings are in line with evidence that empathy impairment is an important mechanism in explaining the behavioural characteristics of antisociality (Hunnikin et al., 2020). Antisocial traits appear more often in individuals with low trait empathy, which indicates lower adherence to COVID-19 preventative measures. Nivette et al. (2021) demonstrate this further with their ongoing longitudinal cohort study in Switzerland ( $N=737$ ) where psychological factors were measured at ages 15-20 and non-compliance with public health measures (e.g., hand washing, social distancing, and masking) were measured at age 22. Non-compliance was higher in individuals who had previously scored high on indicators of antisocial characteristics (Nivette et al., 2021). Therefore, demonstrating that non-compliance and antisocial traits are associated longitudinally and cross-sectionally (i.e., when measured both before and during the pandemic).

To date, there have been few longitudinal studies on empathy's role in adherence to virus preventative measures. This represents a notable limitation to the current knowledge. Indeed, according to Vaillancourt et al. (2021), changes in the context of COVID-19 requires longitudinal data that *pre-dates* the pandemic. The one longitudinal study that has examined prosocial attributes and empathy among adolescents (ages 13-18) prior to the pandemic

(December 2019) and during the pandemic lockdown was conducted in the Sichuan Province, China (July 2020). Results showed that empathy predicted prosocial attributes longitudinally as prosocial attributes in wave 1 were significantly associated with empathy at wave 2, and higher empathy at wave 1 significantly predicted higher prosocial attributes at wave 2 (Yang et al., 2023). Given that empathy develops in childhood and adolescence as children's cognitive skills including executive functioning and language advance (Davis, 1980; Decety & Svetlova, 2012), and that public health messaging was oriented toward the behaviour of adults, there is a gap in knowledge of how empathy in childhood and adolescence predicts the motivation for adherence during a pandemic crisis.

Researchers have proposed that empathy positively develops across childhood and adolescence and then stabilizes in adulthood (Allemand et al., 2015; Gaspar et al., 2022). A systematic review of 17 longitudinal studies showed that adolescents who report engaging in previous prosocial behaviour show higher levels of prosocial behaviour overtime (Silke et al., 2018). There is however heterogeneity in the development of empathy. For example, longitudinal studies examining the developmental trajectories of empathy found that adolescents fell into one of three empathy trajectory groups; high, moderate, and low, and that the high trajectory groups demonstrated increasing levels of empathy whereas the moderate and low groups remained stable overtime (Farrell & Vaillancourt, 2020; Van Lissa et al., 2015). In the present study, trajectories of empathy from ages eleven to sixteen were examined in the prediction of COVID-19 preventative behaviour.

### **Theoretical Framework**

The Protective Motivation Theory (PMT; Rogers, 1975) will be used as the theoretical framework in the current study. PMT was originally developed for understanding the impact of fear appeals, however, subsequent research on PMT has typically used it as a framework to develop and evaluate persuasive communications or as a social cognition model to predict behaviour (Norman et al., 2015). PMT consists of two cognitive processes: the threat-appraisal process and the coping-appraisal process. Evaluations of potential threat and coping factors combine to form the intervening variable of protective motivation. Like other types of motivation, protective motivation arouses, sustains, and directs activity. Since a threat must be identified before there can be an evaluation of the coping options, the threat-appraisal process is

addressed first. The threat-appraisal consists of maladaptive response rewards (intrinsic and extrinsic) and the perception of threat (severity and vulnerability). Rewards will increase the probability of selecting the maladaptive response (not to protect the self or others), whereas the perception of threat will decrease the probability of selecting the maladaptive response. The coping appraisal process evaluates the ability to cope with and prevent the threatened danger. This process incorporates two efficacy variables, response efficacy (the belief that the adaptive response will work) and self-efficacy (the perceived ability of the person to carry out the adaptive response), in addition to response costs which are any costs (e.g., monetary, personal, time, effort) associated with taking the adaptive coping response. Response efficacy and self-efficacy will increase the probability of selecting the adaptive response, whereas response costs will decrease the probability. The output of these appraisal processes is the intention to perform a recommended behaviour (i.e., protection motivation). Rogers asserts that attitude change is not a result of an emotional state of fear but rather is a function of the amount of protective motivation incited by threat- and coping-appraisal processes. Possibly, empathy can enhance these processes by helping individuals better understand the consequences of the threat and the importance of protective actions.

### **Current Study**

Given the lack of longitudinal behavioural studies, the purpose of my thesis was to examine if empathy assessed in childhood and adolescence predicts COVID-19 preventative behaviour in young adulthood. Personality has found to have strong stability over time (Bazana and Stelmack, 2004; Bleidorn et al., 2022), thus, examining personality traits predictions of health behaviour during young adulthood (an age associated with non-compliance to health recommendations; Brankston et al., 2021, Dharma & Bondy, 2023, Murali et al., 2023) highlight and inform development for teaching and targeting empathy in youth. I also examined the moderating role of gender in the relation between empathy and preventative behaviour during COVID-19, as previous studies have shown that these variables moderate this relation (Otterbring & Festila, 2022; Volk et al., 2021). Specifically, empathy tended to be higher in girls and women than in boys and men during the COVID-19 pandemic (Hajek & König, 2022; Guadagni et al., 2020) and women were more likely than men to follow public health advice (Dharma & Bondy, 2023; Turk et al., 2021; Morstead et al., 2021). Women who were empathetic

adhered to preventative measures even more diligently (Morstead et al., 2021). Cross-sectionally, empathic concern and perspective taking, measured with the Interpersonal Reactivity Index (Davis, 1980), was found to be correlated with social distancing (Galang et al., 2021). Since evidence has suggested that empathy is a personality trait that demonstrates stability and early empathy levels may be a marker for its later developmental trajectory (Van Lissa et al., 2015), I predicted that in line with Farrell and Vaillancourt (2020) and Van Lissa et al. (2015) there would be a high, moderate, and low trajectory group. Moreover, membership in the high empathy trajectory group will predict higher adherence to COVID-19 preventative measures in young adulthood and membership in the low empathy trajectory group will predict lower adherence. The strength of this relation was expected to be moderated by gender, such that the associations between empathy and COVID-19 preventative behaviour would be stronger in women than in men.

## **Methods**

### **Procedure**

Data from the McMaster Teen Study, a prospective longitudinal investigation of youth mental health, bullying, and development that began in 2008 when youth were age 11 (Time 1) and has continued annually until 2023 (age 23; Time 13), was used for the study. Ethics approval was received from the school board and the associated university every year. Parental consent and participant assent were collected for the student portions of the survey until age 16, and then participant consent was obtained thereafter. In the first year of the study, students completed the survey with a pen and paper at school. In recent years, participants completed self-reports using an online format. Compensation for participation consisted of gift cards worth \$5 to \$100, depending on the year of participation.

### **Participants**

In 2008, participants at Time 1 ( $M_{age} = 10.91$ ; 53% girls) were recruited from 51 randomly selected southern Ontario schools. For the longitudinal study, 875 students agreed to participate and 80% ( $n = 703$ ) participated in at least one of the annual follow-ups from Time 2 to Time 14. A yearly household income was estimated by parents, with the median of \$70,000–\$80,000 at Time 1, and 74% of parents reported to have obtained post-secondary education at

Time 1. To be included in the analytical sample, participants needed to have data on empathy at least one time point between age 11 (Time 1) to age 16 (Time 6), and data on COVID-19 behaviour at age 23 (Time 13). The final analytical sample consisted of 361 participants, of which 63% were women.

## **Measures**

### ***Empathy***

Empathy was represented as a composite variable consisting of two related variables: empathic concern and perspective taking. Empathic concern and perspective taking were assessed with seven items each from the Interpersonal Reactivity Index self-report (IRI; Davis, 1980). A sample item for empathic concern included “When I see someone treated poorly, it bothers me” and for perspective taking included “I try to understand how other kids feel before I decide what to say to them”. The items were rated on a 5-point scale (0 = not at all like me to 4 = always like me). Internal reliability was good at each time point ( $\alpha = .88$  to  $.90$ ).

### ***COVID-19 Preventative Behaviour***

Following public health guidelines was measured with the Understanding Changes in Behaviour self-report questionnaire consisting of 38 items adapted from Parker et al., (1993), Wise et al. (2020) and items were modified or developed for the McMaster Teen Study including the answer format. This questionnaire examines behavioural differences in coping with the COVID-19 pandemic. Response options included “Yes”, “No” or “Not applicable” for questions that may not apply to some participants (e.g., “I have avoided physical contact with my romantic partner”). Five items from the questionnaire were used in the current study to assess preventative behaviour. The five items were: “I have avoided public places”, “I have cancelled or avoided travel”, “I have avoided crowds”, “I have washed my hands more”, and “I have taken more care about cleanliness”. Scores were averaged to form a composite variable labelled Public Health Recommendations with an acceptable internal reliability ( $\alpha = .63$ ).

## **Analytic Plan**

An exploratory factor analysis (EFA) was first conducted to determine the number of factors within the COVID-19 behaviour measure. The trajectories of empathy were examined

across Times 1 (age 11) to 6 (age 16) using a latent class growth analysis (LCGA) on MPlus version 7.4 (Muthén & Muthén, 1998-2017). For assessing model fit of the trajectory groups, the Bayesian information criterion (BIC; Schwartz, 1978), entropy, the Lo-Mendell-Rubin likelihood ratio test (LMR-LRT; Lo et al., 2001), and the bootstrapped likelihood ratio test (BLRT; McLachlan & Peel, 2000) were used. Lower BIC values demonstrate a more parsimonious model, and higher entropy values (i.e., closer to 1) reflect better fit (Jung & Wickrama, 2007; Nagin 2005; Nylund et al., 2007). Significant LMR-LRT and BLRT values indicate a better fitting model than the model with one fewer class. The number of participants in each group and the theoretical clarity were also considered for model best fit. Posterior probabilities were used to identify the probability of each participant belonging to a specific trajectory group. Up to four classes were tested with starting values increased to LRTSTARTS = 0 0 300 20 to avoid local solutions (Jung & Wickrama, 2007). Trajectory groups were saved and imported to SPSS. A series of one-way ANOVAs were used to investigate whether adherence to public health recommendations at age 23 depended on empathy trajectory groups across childhood (age 11 to 16). Gender differences among trajectory groups were examined using a chi-square test.

## Results

### Missing Data Analysis

The analytical sample included participants with at least one data point from the key study variables between ages 11 to 16, and data at age 23 ( $N = 361$ ). Participants in the analytical sample and participants from the larger longitudinal study were compared to see if there were any significant differences in the demographic variables. Participants in the analytical sample were more likely to be girls/women ( $\chi^2(1) = 20.775, p < .001$ ) and have parents with higher education ( $\chi^2(4) = 23.756, p < .001$ ) than the non-selected sample based on the adjusted standardized residuals of 1.96 or above. There were no significant differences in household income ( $\chi^2(7) = 12.489, p = .086$ ) or ethnicity (White or non-White;  $\chi^2(1) = 0.059, p = .808$ ) between the selected and non-selected sample. Skewness and kurtosis values were below the standard range (i.e., below 3 for skewness and below 10 for kurtosis; Kline, 2011). Little's missing completely at random (MCAR) test was used to examine whether data was missing at random for the key study variables. Little's MCAR test was not significant, indicating that data was missing at random ( $\chi^2(121) = 121.469, p = 0.471$ ).

## Exploratory Factor Analysis

In the greater study, the McMaster Teen Study, a 38 item Understanding Changes in Behaviour questionnaire was used to examine behavioural differences in coping with the COVID-19 pandemic. Thus, for the purpose of the current study a maximum likelihood exploratory factor analysis (EFA) was conducted to examine a more parsimonious representation of COVID-19 preventative behaviour. The approach for the EFA was to concentrate items that represented *behaviour that benefitted society* thus, encouraged viral mitigation and aligned with government public health recommendations ( $n$  items = 6). Initially, nineteen items were not related to COVID-19 viral mitigation (e.g., “I have exercised more” and “I have drunk more alcohol”) and were removed from analysis. Eight items were not considered aligned with public health recommendations (e.g., “I have purchased extra medical supplies”), and six items were behaviour that were not considered to benefit society (e.g., “I have avoided touching my face”). The item “I have worn a facemask” was removed as it was the only item with a low factor loading (.097) showing a misalignment with the underlying construct represented by the other items. Items left loaded onto one factor with factor loadings greater than .47 ( $n$  items = 5; see Table 1). Results of the EFA indicate that a one-factor solution accounted for 45.19% of total variance in responses. Items were used to create a composite variable labeled “public health recommendations” for all further analyses.

**Table 1***EFA Factor Loadings and Inter-Item Correlations*

Items	Factor Loadings	1	2	3	4	5
1. I have cancelled or avoided travel	0.472	-	.28**	.17**	.15**	.24**
2. I have washed my hands more	0.695		-	.33**	.42**	.26**
3. I have avoided crowds	0.727			-	.38**	.43**
4. I have taken more care about cleanliness	0.731				-	.34**
5. I have avoided public places	0.702					-

*Note.* \* $p < .05$ ; \*\* $p < .01$ .

**Descriptive Statistics**

The descriptive statistics for empathy across ages 11 to 16 for the overall sample and gender are presented in Table 2 as well as the descriptive statistics for public health recommendations at age 23. For the overall sample, across ages 11 to 16, empathy had a gradual increase, with a significant positive intercept and positive slope. Correlations among all study variables across time points are presented in Table 3. Empathy was significantly correlated across all time points ( $r = .36$  min and  $r = .72$  max).

**Table 2***Descriptive and Frequency Statistics for all Study Variables*

	Sample Range			<i>M</i>	<i>SD</i>
	<i>n</i>	Min	Max		
Empathy					
Age 11	339	0.71	4.00	2.57	0.62
Age 12	328	0.71	4.00	2.48	0.57
Age 13	338	0.93	4.00	2.50	0.58
Age 14	328	1.00	3.93	2.59	0.59
Age 15	330	0.29	4.00	2.64	0.58
Age 16	320	0.5	3.93	2.70	0.60
COVID-19 Behaviour					
Public Health Recommendations	361	0.2	1.00	0.91	0.15

**Table 3***Correlations Among all Study Variables*

Variables	1	2	3	4	5	6	7
1. EMP – Age 11	--	.59**	.53**	.46**	.41**	.36**	.11
2. EMP – Age 12		--	.67**	.58**	.50**	.47**	.15**
3. EMP – Age 13			--	.69**	.61**	.54**	.22**
4. EMP – Age 14				--	.72**	.65**	.08
5. EMP – Age 15					--	.71**	.13*
6. EMP – Age 16						--	.19**
7. PHR							--

*Note.* \* $p < .05$ ; \*\* $p < .01$ . EMP = empathy. PHR = public health recommendations.

**Developmental Trajectories**

The final model selected for empathy was the three-group solution (see Table 4, Figure 1). In comparison to a two-group or four-group solution, the three-group solution had a higher entropy than other solutions. The three-group solution also had a slightly higher BIC than the four-group solution but was substantially lower than the two-group solution. The LMR-LRT and BLRT values were significant and indicated a better fit than the two-group model. Additionally, in the four-group solution the LMR-LRT value was not significant and indicated that this solution was not a better fit than the three-group solution. The three-group solution also contributed to theoretically meaningful groups.

Trajectory group names were chosen based on the most prominent features of the trajectory (i.e., mean levels, shapes, and slopes) relative to one another (see the final solution groups presented in Figure 1). Most of the participants reflected a trajectory group that was

moderate on empathy and slightly increased over time (moderate increasing; 53.5%,  $n = 193$ ; 82 boys/men, 111 girls/women; intercept = 2.332,  $p < .001$ ; slope = 0.052,  $p < .001$ ). The second largest proportion of participants reflected a trajectory of high empathy that was slightly increasing over time (high increasing; 33.5%,  $n = 121$ ; 28 boys/men, 93 girls/women; intercept = 2.952,  $p < .001$ ; slope = 0.041,  $p < .001$ ). The smallest proportion reflected a trajectory that was low on empathy and remained mostly stable over time (low stable; 13.0%,  $n = 47$ ; 29 boys/men, 18 girls/women; intercept = 1.814,  $p = 0$ ; slope = -0.022,  $p = .448$ ). Posterior probabilities were 0.916 for the moderate increasing group, 0.927 for the high increasing group, and 0.947 for the low stable group, indicating that participants were well identified within their trajectory groups.

**Table 4**

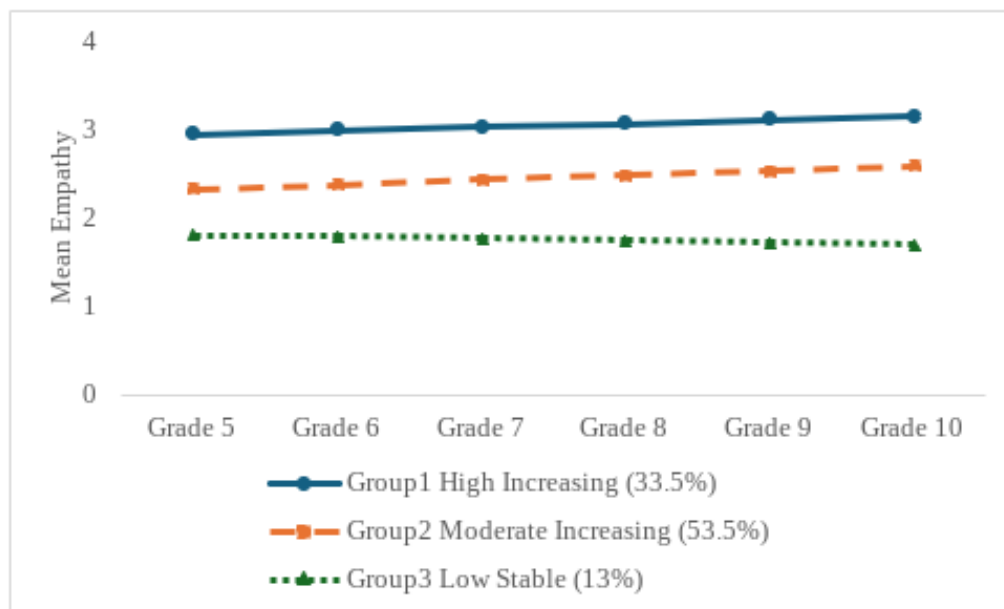
*Fit Indices for Latent Class Growth Analysis for Empathy*

<b>No. of groups</b>	<b>BIC</b>	<b>LMR-LRT</b>	<b>BLRT</b>	<b>Entropy</b>
1 Class	3578.81	NA	NA	NA
2 Class	3015.58	0.044	<0.001	0.773
3 Class	2755.99	<0.001	<0.001	0.832
4 Class	2709.88	0.063	<0.001	0.786

*Note.* BIC = Bayesian information criterion; LMR-LRT = Lo-Mendell-Rubin likelihood ratio test; BLRT = bootstrap likelihood ratio test.

**Figure 1**

*Developmental Trajectories of Empathy Across Childhood to Adolescence (ages 11 to 16)*



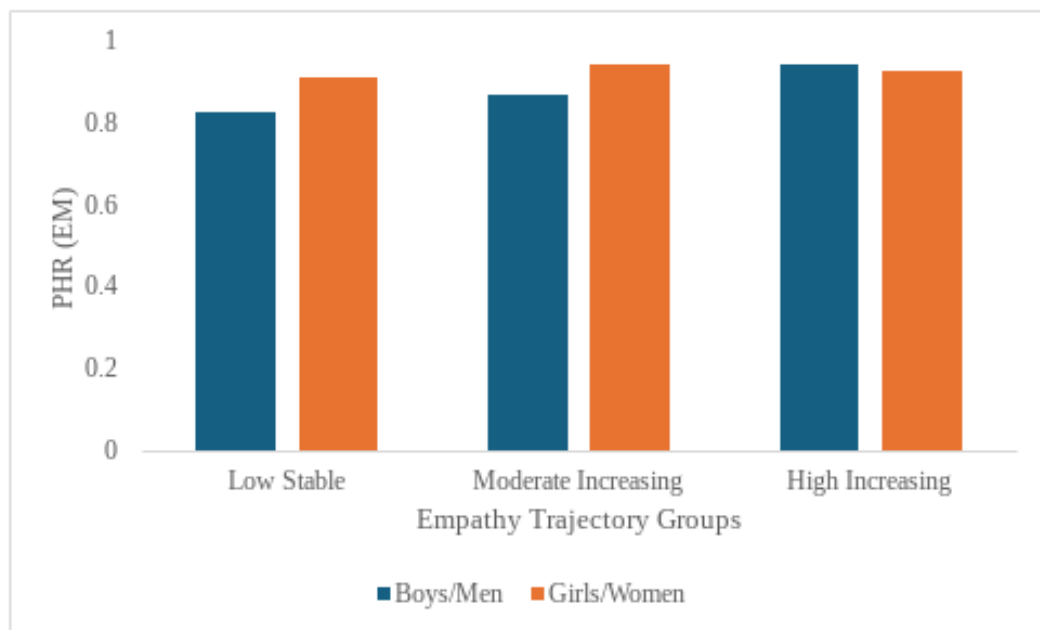
### Predictors of Trajectory Group Membership

There were differences in the proportion of boys/men and girls/women across the empathy trajectory groups,  $\chi^2(2, N = 365) = 24.188, p < .001$ . Standardized residuals revealed that girls/women were significantly overrepresented in the high increasing trajectory group ( $z = +2.20$ ; 77% girls/women vs. 23% boys/men). In contrast, boys/men were significantly overrepresented in the low stable trajectory group ( $z = +2.60$ ; 62% boys/men vs. 38% girls/women).

### Trajectory Group Membership and COVID-19 Behaviour

A one-way ANOVA was conducted to explore mean differences between empathy trajectory groups and public health recommendations. Findings showed that the effect of trajectory group membership was significant,  $F(2, 358) = 3.777, p = .024, \eta^2 = .021$ . Post hoc comparisons using the Bonferroni correction revealed that participants in the high increasing trajectory group ( $M = 0.932, SD = 0.114$ ) differed from the low stable trajectory group ( $M = 0.859, SD = 0.220$ ),  $p = .019$ . No other group differences were statistically significant.

Next, a 3x2 (empathy trajectory groups x gender) ANOVA was conducted to compare public health recommendations across empathy trajectory groups, moderated by gender. The two-way interaction of empathy trajectory groups and gender was not significant  $F(2, 355) = 2.711, p = .068, \eta^2 = .015$ . However, given the marginally significant  $p$ -value and my interest in gender-specific associations, I explored the interaction. Pairwise comparisons indicated that public health recommendation ratings were significantly higher for boys/men in the high increasing empathy trajectory group than they were for boys/men in the moderate increasing ( $M = 0.87, SD = 0.17; \text{mean difference} = 0.073, p = .029, 95\% \text{ CI } [0.008, 0.138]$ ), and in the low stable ( $M = 0.83, SD = 0.28; \text{mean difference} = 0.115, p = .004, 95\% \text{ CI } [0.036, 0.194]$ ) trajectory groups. There was no significant difference found in girls/women between high, moderate, and low trajectory groups (see Figure 2). There was no significant main effect of empathy trajectory groups in public health recommendation ratings  $F(2, 355) = 2.912, p = .056, \eta^2 = .016$ . However, gender was a significant predictor of public health recommendation ratings  $F(1, 355) = 5.606, p = .018, \eta^2 = .016$ . Overall, girls/women ( $M = 0.93, SD = 0.12$ ) were higher than boys/men ( $M = 0.88, SD = 0.19$ ) in adhering to public health recommendations.

**Figure 2***Empathy Trajectory Groups and Gender on Public Health Recommendations*

*Note.* Bar graph illustrating estimated marginal means of public health recommendations between gender and empathy trajectory groups. PHR = public health recommendations.

## Discussion

Empathy tends to develop positively through childhood and adolescence with the development of social-cognitive capacities, such as understanding and coordinating perspective of the self and others (Hoffman, 2000) and then stabilizes in adulthood (Allemand et al., 2015; Gaspar et al., 2022). Following public health guidelines has been characterized as a prosocial act (Pfatteicher et al., 2020) by sacrificing one's comfort for the overall good of the group (Galang et al., 2021). The goal of my thesis was to fill a gap within the literature and examine the longitudinal associations between empathy in childhood and adolescence (e.g., empathic concern and perspective taking) and adherence to public health recommendations during the COVID-19 pandemic as a young adult. Longitudinal and behavioural research can provide associations that inform public policies and highlight the need to target empathy at the time of its development.

In line with my first prediction, three trajectories of empathy categorized as high, moderate, and low were found to best describe the sample. Specifically, the trajectory groups consisted of a high increasing group (33.5%), a moderate increasing group (53.5%), and low stable group (13%). This adds support to the three-level empathy trajectories found by Farrell and Vaillancourt (2020) and Van Lissa et al. (2015). In addition to supporting the literature that indicates general increases in empathy in childhood and adolescence (Allemand et al., 2015; Gaspar et al., 2022). Gender differences among trajectory groups were significant, such that the high increasing trajectory group favoured girl/woman membership, and the low stable trajectory group favoured boy/man membership. These findings are consistent with previous literature stating that girls at ages 11 and 13 have a higher intercept that increases over time than boys (Gaspar & Esteves, 2022, Van Lissa et al., 2020, Van der Graaff et al., 2014).

It was expected that a high trajectory of empathy would be associated with greater adherence to public health guidelines than a low trajectory, and the association would be moderated by gender. Prior to adjusting for gender, results confirmed my prediction, and participants with a high trajectory adhered to guidelines more than those with a low trajectory of empathy. When adjusting for gender, differences between trajectory group membership on adherence to public health recommendations approached significance, suggesting a possible trend that warranted further investigation. My findings are less conclusive than previous cross-sectional (Carvalho et al., 2021; Dinić et al., 2021; Pfatteicher et al., 2020) and longitudinal (Morstead et al., 2022; Wright and Fancourt, 2021) literature that report statistically significant associations between empathy and adherence to public health recommendations while adjusting for gender. Notably, few longitudinal studies have incorporated empathy data that pre-dates the pandemic and therefore lack the relation between behaviour change to pre-existing personality trends. Yang et al. (2023) are the only researchers to my knowledge to collect data on empathy prior to the enrollment of government public health recommendations, but they investigated general prosocial attributes rather than behaviour related public health guidelines.

Although the strength between trajectories of empathy and gender on adherence rates were marginal, I advanced with investigating the moderation of gender as I anticipated that identifying as a woman and having a high trajectory of empathy would be associated with greater adherence rates. Post hoc comparisons pointed toward men with a high trajectory of empathy

adhered to public health recommendations more than men with a moderate or low trajectory. In comparison, women reported adherence to recommendations regardless of their trajectory of empathy and overall reported greater adherence than men. These results support prior research showing that women are more likely to comply with COVID-19 public health policies, whether due to women were more likely to be concerned with the health of the overall population and therefore more likely to take precautions, (Dharma & Bondy, 2023); demonstrated more autonomous motivation and empathic emotions and therefore complied (Wollast et al., 2024); or had a higher frequency of implementing guidelines than men (Turk et al., 2022; Morstead et al., 2021). In contrast, there is evidence that the lowest self-reported adherence was from young males in well-developed countries (Lin et al., 2021). Gender differences found in my thesis reinforce the importance of investigating gender when exploring adherence to public health recommendations.

Importantly, the results of the present study showed partial support for how I predicted gender to function as a moderator. Women did adhere to recommendations more than men; however, the trajectory of empathy may only matter for men. This discrepancy can be approached with Protective Motivation Theory (PMT; Rogers, 1975), which posits that perceived severity and vulnerability to the virus (threat appraisal) and belief in efficacy of the protective behaviour and belief in one's self-efficacy in doing the behaviour (coping appraisal) are motivators for protective behaviour. These appraisals include any perceived rewards for not protecting oneself or others, and any perceived costs to the protective behaviour. In the context of the COVID-19 pandemic, studies have found that men were less likely to consider public health recommendations to be effective and had less confidence in their ability to comply compared to women (Brankston et al., 2021). Additionally, among a Canadian sample, being young and male was associated with lower baseline behavioural intentions in preventative measures (Mourali et al., 2023). Given that young adults were less at risk of severe health concerns from the virus (Public Health Agency of Canada, 2021), combined with a lack of efficacy in preventative measures, it may be that men perceived low reward and high cost to adhering to preventative measures. The current study suggests that threat and coping appraisals for protective motivation may differ among men according to their trajectory of empathy in childhood and adolescence.

Differences found between men of low and high trajectories may be explained by the multifaceted relationship between empathy and adhering to public health recommendations. Accordingly, empathy has been found to mediate and weaken the negative effect of selfishness on adherence with protective measures, while also being a significant mediator to the positive effect of anonymous prosociality on protective behaviour. (Dinić et al., 2021). Additionally, empathic responding moderated the relationship between those who found the threat of COVID-19 less personally threatening and their association to higher adherence (Morstead, 2022). Empathy may be related to a personality type that is associated with healthy coping responses like emotional support and problem solving (Volk et al., 2021). Furthermore, agreeableness, a trait associated with empathy, is related to less negative affect to individuals experiencing a stressor (Leger et al., 2016). Whereas a lack of coping skills contributes to strong negative emotions caused by public health recommendations (Eichenberg et al., 2021), that in turn influence perceived reward and cost of adherence.

In sum, my thesis indicates a trend that trajectories of empathy in childhood and adolescence may predict adherence to public health recommendations in young adulthood and supports that women overall adhere to recommendations more than men. This study is the first to contribute to the growing body of COVID-19 literature by exploring the influence of childhood personality development and behaviour during a global pandemic. Although effects were marginal, my thesis provides sufficient evidence for future studies to investigate this relation to settle discrepancies reported here and further inform public health policy, messaging, and point of intervention to increase adherence rates.

### **Limitations and Future Research**

The present study has several strengths including its longitudinal design with data that pre-dates the pandemic which is required when reporting changes in the context of COVID-19 (Vaillancourt et al., 2021) and allows for insights on points of intervention as early as childhood and adolescence. Despite these strengths, there were also some limitations. To begin, although data were determined to be missing at random, the analytical sample (39% boys/men vs. 61% girls/women;  $N = 361$ ) were more likely to be girls/women compared to the larger longitudinal study (56% boys/men vs. 44% girls/women;  $N = 703$ ). In addition, those with lower trait agreeableness have been associated with increased risk of attrition (Hansson et al., 2018). Thus,

there might be overrepresentation of women and compassionate participants in the analytic sample. The analytical sample included participants with parents of higher education than the larger longitudinal study, which was not adjusted for in the analysis. Notably, the size of the final sample was small, due to participant attrition, which was associated with study drop out, relocation, and a change in contact information over time. Participant attrition is expected given the thirteen years between empathy and COVID-19 behaviour data collection. Nonetheless, the small sample likely underpowered analyses and lead to marginal effects in key variables of this study. More research with larger samples is needed to determine if the same patterns in the present study occur.

Gender was examined through a binary measure of boy/man or girl/woman. This not only can result in gender misclassification (Camerson & Stinson, 2019) but restricts the generalizations of the current findings to individuals who identify as a boy/man or a girl/woman. Therefore, this study cannot expand on evidence suggesting there are differences in public health recommendation adherence for individuals who identify their gender under a “other” category (Morstead et al., 2022). I did not examine adherence rates to public health recommendations in subsequent years of the COVID-19 pandemic and is thus limited to observations in the first few months of lockdown in Ontario, Canada. Although examining initial responses to a novel global pandemic like COVID-19 provides insight for the rollout of future emergency public health policies, it offers limited understanding of how empathy in childhood and adolescence influences adherence rates over the extended time in which recommendations remained in effect. Additionally, there is evidence that prosociality during the pandemic increased with age (Cho et al., 2022). The extent to which the present findings can be generalized is young adulthood (age 23) which may be a unique age group during the pandemic as Public Health stated those who are younger are at lower risk for severe health outcomes (Public Health Agency of Canada, 2021). To achieve a deeper insight into how empathy in childhood and adolescence shapes adherence, future studies should consider having inclusive gender categories, age group comparisons, and the impact of empathy on adherence to guidelines at multiple time points.

A further limitation of this study is the examination of only one covariate on empathy trajectories and adherence. It would be of particular interest for future research to incorporate antisocial behaviour alongside empathy trajectories as anti-social behaviour is associated with

low empathy (Ellis, 1982; Hunnikin et al., 2020) and low adherence rates during the COVID-19 pandemic (Carvalho & Machado, 2020; Miguel et al., 2021; Nivette et al., 2021). Furthermore, the COVID-19 literature has robust evidence that political ideology and feelings towards the government are influential on adherence rates. For instance, studies have indicated associations between adherence to public health policy and diverse media consumption (Grant et al., 2024); trust in the government, respect for authority, and moral value of fairness (Almeida-Silva et al., 2024); and analytical thinking towards experts and information sources (Čavojová & Ballová, 2024). The political climate during the COVID-19 pandemic contributed to increased skepticism and negative perceptions of government and scientific authorities. Accordingly, it may be prudent to focus intervention research efforts on the pre-pandemic period to account for this novelty when investigating those at risk of non-compliance in future public health emergencies.

### **Educational and Clinical Implications**

The outcomes of the present study highlight gender differences in adherence to public health recommendations and show marginal evidence towards trajectories of empathy beginning at age 11 predicting the likelihood of adherence to public health recommendations during the COVID-19 pandemic at age 23. Although the relation between empathy trajectories requires further investigation with a larger sample to confirm its strength, this outcome has several implications. Specifically, gender differences indicated that women generally adhered to recommendations more than men. Whereas trajectories of empathy only mattered among men in relation to predicting adherence, particularly men with a moderate or low trajectory of empathy. This points to the population consisting of a sub-group of individuals that are less likely to comply with public health recommendations and could therefore be targeted with tailored messaging. More importantly, the focus of the rest of the population that is more likely to adhere can turn toward uplifting their well-being. Eichenberg et al. (2021) showed that some individuals entered the pandemic equipped with healthy coping strategies, while others did not, which led to increased anxiety and stress. Although both groups adhered to public health recommendations, they did so in different states of well-being. This is important to note considering anxiety symptoms generally increased over the pandemic (Hawes et al., 2022; Krygsman et al., 2023). If negatively framed messages increase negative emotional arousal and poorer coping during the pandemic (Heffner et al., 2021; Weiß et al., 2022) there is more emphasis for public health

agencies to drop negative or fear-based messaging and promote messaging that cultivates individual well-being.

Another implication of my thesis is further emphasizing the importance of targeting empathy in children and adolescents to benefit the overall good of society. Results of the present study inform policy makers by suggesting that early intervention of fostering empathy may help improve adherence to public health recommendations during disasters like a global pandemic. Indeed, interventions on empathy in childhood and adolescence have shown to be successful with the examples of the Roots of Empathy program (ROE; Gordon, 2003) and the COPE-Resilience Program (COPE-R; Frydenberg et al., 2020). ROE is a school-based program that incorporates empathy and education on parenting through visits to the classroom by a parent and infant from the neighborhood (Gordon, 2003). Outcomes of ROE include students exhibiting an increase in empathy and prosocial behaviour (e.g., sharing, helping, and including), a decrease in aggression (Gordon 2003; MacDonald et al., 2015) and the effect of increased prosocial behaviour maintained or continued to improve three years after the program (Santos et al., 2011). The COPE-Resilience Program is six weeks of structured lessons consisting of a foundational topic of emotion and lessons in Caring, Open Communication, Politeness, and Empathic Sharing (Frydenberg et al., 2020). Results of a study showed that preschoolers in Australia ( $N = 69$ ; aged four to five years) participating in the program significantly gained teacher-rated prosocial behaviour and positive coping skills (Soliman et al., 2021). Accordingly, meta-analyses have also confirmed the effectiveness of intervention on empathy in childhood and adolescence. Twenty randomized controlled trials in the past fifteen years showed that experiential learning programs were effective in improving prosocial behaviour, empathy, and subjective well-being in adolescence (Chan et al., 2021). Additionally, nineteen school-based programs that target empathy across childhood and adolescence, were found to have larger effects if interventions were earlier in development and included more empathy-related constructs (e.g., perspective taking and prosocial behaviour; Malti et al., 2016). At the rapid pace COVID-19 evolved into a global crisis, it is too late to intervene on the issue of low adherence to mitigation strategies and therefore should be targeted earlier in life, before the crisis occurs.

Importantly, there are research implications the present study has by adding to the small amount of literature that includes longitudinal data *prior* to the COVID-19 pandemic.

Longitudinal data only within the COVID-19 pandemic limits the considerations to how the pandemic temporality influences the relation between events (Vaillancourt, 2021). Meaning, any patterns or relationships observed are shaped by the unique context and timing of the pandemic itself. The examination of empathy trajectories in childhood and adolescence and well before the COVID-19 pandemic, not only indicates a time for intervention, but also allows for stronger inferences about causal relationships, and establishes temporal precedence. Additionally, my thesis adds to behavioural science research that was underinvested in when informing public health policies (Collins, 2024). Balancing the health and well-being of the population with the rapidly changing COVID-19 crisis is a challenge that needs to be informed by multiple scientific disciplines. Particularly when the crisis requires large-scale behaviour change that place significant psychological burdens on individuals (Bavel et al., 2020).

### **Conclusion**

Trajectories of empathy in childhood and adolescence on adherence to COVID-19 public health recommendations in young adulthood were examined. Public health campaigns were launched worldwide to inform and enforce preventative measures to mitigate the rapid spread of the COVID-19 virus. The challenge of these campaigns was to have the population act on behalf of themselves and others, in ways that are psychologically burdening (Bavel et al., 2020) and sacrificing to one's comfort (Galang et al., 2021). My thesis fills a gap within the literature by gaining a longitudinal understanding of empathy prior to the pandemic and its association with behavioural change during the initial implementation of COVID-19 public health measures. The results suggest gender differences in adherence—women self-reportedly adhered more than men but men with low empathy may have also adhered less than men with high empathy. Marginal values of significance call for future research to replicate our findings with larger samples. Nonetheless, these findings demonstrate a need for further research regarding personality differences on behavioural intentions during a global crisis to inform when intervention is necessary. Additionally, results of my thesis enforce previous studies calling for public health messaging to be informed by various scientific expertise to create effective communication and holistic and compassionate policy (Dodsworth et al., 2024). By continuing to investigate these gaps in the literature, researchers, educators, and policy makers will be able to effectively work together to minimize stress and burden in future pandemic emergencies.

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