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Interpersonal dysfunction in individuals high in chronic worry: relations with interpersonal problem-solving

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Abstract

Background: Interpersonal dysfunction has been proposed as an important maintenance factor in chronic worry and generalized anxiety disorder (GAD). Perceptions of problems and the problem-solving process as threatening, and unhelpful (e.g. avoidant, impulsive) problem-solving styles are implicated in worry and have also been suggested to be associated with dysfunctional interpersonal styles.

Aims: The present study assessed the relationships between interpersonal dysfunction and problem-solving orientation, approach, and effectiveness in a sample of individuals high in chronic worry and investigated the indirect effect of interpersonal dysfunction on GAD symptom severity through negative problem-solving beliefs and approaches.

Method: Fifty-nine community participants completed questionnaires and an interpersonal problem-solving task.

Results: Greater interpersonal dysfunction was significantly associated with greater negative problem-solving orientation and greater habitual avoidant and impulsive/careless problem-solving styles. Greater interpersonal dysfunction was associated with poorer effectiveness of solutions when the task problem involved conflict with a romantic partner. Negative problem-solving orientation fully mediated the relationship between interpersonal dysfunction and GAD symptoms.

Conclusions: These findings support that problem-solving processes are implicated in interpersonal dysfunction and that negative beliefs about problem-solving account for the relationship between interpersonal dysfunction and GAD symptoms. Theoretical implications are discussed.

Keywords: interpersonal dysfunction; interpersonal problems; problem-solving; worry

Introduction

Chronic worry is a form of repetitive negative thinking (RNT) and is a common feature across anxiety and depressive disorders (Ehring and Watkins, 2008; McEvoy *et al.*, 2013b). According to Borkovec and colleagues' (1983) original definition of worry, worry was described as an attempt to engage in mental problem-solving for uncertain, and potentially negative, outcomes. However, chronic and uncontrollable worry is unlikely to lead to effective problem solutions that prevent feared outcomes (Davey *et al.*, 1992; Szabó and Lovibond, 2002). One of the most common worry topics reported by people high in chronic worry are interpersonal problems (Breitholtz *et al.*, 1999; Roemer *et al.*, 1997). It is perhaps unsurprising that worry is often centred on interpersonal concerns given that chronic worry is associated with dysfunctional interpersonal styles that perpetuate relational problems (Newman and Erickson, 2010). In this way, interpersonal dysfunction has been posited to be an important maintaining factor in chronic worry and generalized anxiety disorder (GAD), a condition characterized by excessive and uncontrollable worry (Borkovec *et al.*, 2004a; Sibrava and Borkovec, 2006). However,

there is a need to better understand processes that explain the relationship between interpersonal dysfunction and GAD. One candidate factor that has been suggested to be associated with interpersonal dysfunction in individuals high in chronic worry and GAD symptoms are maladaptive problem-solving processes, including rigid problem-solving approaches and unhelpful beliefs about one's capacity to effectively solve problems (Newman and Erickson, 2010). However, the association between interpersonal problem-solving and interpersonal dysfunction in chronic worry has, to our knowledge, yet to be empirically examined. We sought to investigate the relationship between interpersonal dysfunction and negative beliefs about problems, unhelpful approaches to solving problems, and interpersonal problem-solving effectiveness in chronic worry. Furthermore, we investigated the relationship between interpersonal dysfunction and GAD symptoms through maladaptive problem-solving beliefs and approaches.

Interpersonal dysfunction in individuals high in chronic worry

Early theorizing on the development and maintenance of chronic worry and GAD posited that interpersonal difficulties associated with insecure attachment contribute to the development of chronic worry and GAD symptoms (Borkovec *et al.*, 1998; Borkovec *et al.*, 2002; Cassidy *et al.*, 2009). The model of interpersonal dysfunction in GAD suggests that poor social outcomes reinforce negative beliefs about relationships and maintain worry about relationships (Newman and Erickson, 2010). Furthermore, interpersonal dysfunction in people high in chronic worry and GAD symptoms may reflect the use of avoidance and safety behaviours (Malivoire *et al.*, 2020). For instance, the proclivity to 'check-in' on significant others is an example of a dysfunctional intrusive behaviour used to quell fears about the safety of loved ones (Malivoire *et al.*, 2020). As such, dysfunctional interpersonal behaviours are probably reinforced by the avoidance of feared negative outcomes in interpersonal contexts and the associated negative arousal. Several researchers have stressed the importance of targeting interpersonal dysfunction in the treatment of chronic worry (Borkovec *et al.*, 2002; Newman *et al.*, 2011). Targeting interpersonal dysfunction in cognitive behavioural therapy (CBT) for GAD has been found to lead to reductions in GAD symptoms and interpersonal dysfunction from pre- to post-treatment with medium to large effect sizes; however, the improvements did not differ from a CBT plus supportive listening control condition (Newman *et al.*, 2011). Understanding factors that explain the relationship between interpersonal dysfunction and chronic worry could help to refine interventions to more effectively target interpersonal dysfunction. One such factor that has been established to be associated with chronic worry and GAD symptoms and proposed to be associated with interpersonal dysfunction is maladaptive problem-solving processes.

Interpersonal dysfunction has predominantly been assessed using the Inventory of Interpersonal Problems-Circumplex (IIP-C; Alden *et al.*, 1990; Horowitz *et al.*, 2000). The IIP-C is grounded in the interpersonal circumplex theory of personality, which asserts that interpersonal processes are involved in the development and maintenance of psychopathology (Pincus *et al.*, 2010). The IIP-C is based on a two-dimensional circumplex model consisting of two orthogonal dimensions of dominance (i.e. controlling/dominant to submissive) and affiliation (i.e. cold/hostile to friendly/warm). When crossed, these two dimensions create four quadrants, labelled dominant, submissive, affiliative and hostile, which can be further subdivided into eight octants reflecting very specific interpersonal styles. Higher scores on any dimension, quadrant or octant represent a greater tendency to engage in dysfunctional behaviour.

Using the IIP-C, researchers have sought to characterize interpersonal dysfunction for various clinically relevant problems. The limited research assessing self-reported interpersonal dysfunction in chronic worry as measured by the Penn State Worry Questionnaire (PSWQ; Meyer *et al.*, 1990) found worry to be associated with an affiliative-submissive interpersonal

style (i.e. being taken advantage of and difficulty asserting one's needs), even when controlling for social anxiety and depressive symptoms in student and treatment-seeking samples (Erickson *et al.*, 2016). Clinical and analogue GAD are associated with self-reported affiliative-submissive problems (i.e. problems related to being overly-nurturant, intrusive, exploitable, and non-assertive) as well as non-affiliative problems (i.e. cold and vindictive), which may reflect variation in interpersonal dysfunction across individuals or contexts (Newman and Erickson, 2010). In contrast, social anxiety disorder (SAD) has consistently been associated with submissive and socially avoidant interpersonal dysfunction (Alden and Phillips, 1990; Davila and Beck, 2002; Erickson *et al.*, 2016) even when controlling for GAD and depressive symptoms (Shin and Newman, 2019).

Problem-solving beliefs, approaches and effectiveness

Problem-solving processes have been suggested to link worry and interpersonal dysfunction (D'Zurilla and Nezu, 1982; D'Zurilla and Nezu, 1999; Londahl *et al.*, 2005; Newman and Erickson, 2010). In their seminal model of social problem-solving, D'Zurilla and colleagues define interpersonal problem-solving as attempts to find solutions to or cope with everyday problems involving conflict between two people (D'Zurilla *et al.*, 2004). They identify several maladaptive problem-solving processes, including negative beliefs about problem-solving and maladaptive problem-solving approaches that are suggested to influence one's capacity to effectively problem-solve.

Individuals high in chronic worry have a negative problem orientation (NPO); that is, they report negative attitudes towards problems and doubt their ability to effectively solve problems (e.g. Davey *et al.*, 1996; Dugas *et al.*, 1995; Gosselin *et al.*, 2005; Robichaud and Dugas, 2005). Greater NPO has been shown to be a significant predictor of worry controlling for depression and anxiety symptoms, which suggests that NPO contributes to worry independent of mood (Dugas *et al.*, 1997). The belief that problems are threatening, in combination with anxious arousal is postulated to engender inflexible problem-solving approaches and perseveration in the early phase of generating solutions, which probably compromises overall effectiveness (Mennin *et al.*, 2002). Furthermore, people high in chronic worry use avoidant and impulsive/careless problem-solving approaches (Belzer *et al.*, 2002; Pawluk *et al.*, 2017) that prioritize dampening negative affect in the short-term but are likely to perpetuate the problem.

An avoidant approach involves waiting for the problem to be solved on its own, or shifting the responsibility onto someone else. In contrast, an impulsive/careless problem-solving approach includes applying problem-solving skills in a rushed and hurried fashion, which can result in hasty decision making and failure to adequately consider alternative solutions or potential consequences (Maydeu-Olivares and D'Zurilla, 1995; Maydeu-Olivares and D'Zurilla, 1996). There is preliminary evidence that greater self-reported impulsive/careless problem-solving style uniquely predicts lower problem-solving quality when accounting for NPO, self-reported avoidant problem-solving style, worry, and intolerance of uncertainty (Pawluk *et al.*, 2017). Pawluk *et al.* (2017) suggest that when faced with an anxiety-provoking problem (like a conflict), people high in chronic worry prioritize dampening negative affect over implementing effective problem-solving. As such, behaving impulsively in response to problems may reflect a maladaptive emotion regulation strategy that contributes to the persistence of problems (Pawluk *et al.*, 2017).

Although it has been suggested that individuals high in chronic worry generally possess adequate problem-solving skills (Davey, 1994; Dugas *et al.*, 1997; Ladouceur *et al.*, 1998), some research suggests otherwise. Pawluk and colleagues (2017) assessed interpersonal problem-solving in a sample of people with GAD using the Means-Ends Problem-Solving task (MEPS; Platt and Spivack, 1972), a measure of social/interpersonal problem-solving wherein

respondents are asked to write out solutions to standardized, widely relatable scenarios. Even though participants *in aggregate*, provided adequate solutions on the MEPS, there was variation in problem-solving effectiveness across the sample suggesting that some individuals with GAD do show difficulties solving interpersonal problems (Pawluk *et al.*, 2017). Furthermore, in people high and low in trait worry, problem-solving ability has been found to be impaired when engaging in worry about a personal problem relative to thinking about problems in an objective manner (Llera and Newman, 2020), which supports that problem-solving effectiveness may be compromised in people who worry chronically.

Problem-solving processes and interpersonal dysfunction

According to interpersonal theory in GAD, interpersonal dysfunction is associated with problematic social cognition and unhelpful behaviours (Newman and Erickson, 2010). Individuals who engage in maladaptive interpersonal behaviours may have a proclivity to perceive themselves as inept when faced with threats and may be more likely to use unconstructive strategies to solve interpersonal problems. One tendency may be to perseverate about an interpersonal problem, which may keep people 'stuck' in a ruminative process, leading to inaction. Individuals may also take rash, potentially harmful action to 'fix' the interpersonal problem, in an effort to eliminate it, and the attendant distress and discomfort (D'Zurilla *et al.*, 2004; Newman and Erickson, 2010). These attempts to control interpersonal problems may express themselves in a variety of ways. For example, a person high in chronic worry may put the other person's needs above their own to demonstrate that they care, or they may stop expressing their opinion out of concern that it may worsen conflict. Negative beliefs about one's ability to problem-solve and failed attempts to resolve an interpersonal problem may cause one to feel dejected, which may increase worry about the relationship.

There is preliminary evidence in non-clinical samples that greater interpersonal problems are associated with negative problem-solving beliefs and unhelpful problem-solving approaches. In student samples, relative to people who self-appraise as having good problem-solving capabilities, those who perceive themselves to be poor at solving interpersonal problems have more relationship problems (Heppner *et al.*, 1982) and less social support (Elliott *et al.*, 1992). Greater NPO in college samples has also been found to be associated with greater interpersonal conflict (Londahl *et al.*, 2005) and interpersonal sensitivity (McCabe *et al.*, 1999). Consistently, in a sample of married couples, the tendency to perceive oneself as an ineffective problem-solver was associated with greater marital distress, relationship problems, and disagreement on marital matters (Sabourin *et al.*, 1990). Londahl *et al.* (2005) also observed that the relationship between interpersonal conflict and anxiety was stronger for those high in NPO, providing preliminary support that interpersonal processes interact with NPO to predict anxiety in a college sample. Finally, both avoidant and impulsive problem-solving approaches have also been associated with greater interpersonal conflict and interpersonal sensitivity in undifferentiated student samples (Londahl *et al.*, 2005; McCabe *et al.*, 1999). Collectively, these findings suggest that people's problem-solving beliefs and approaches are associated with interpersonal problems in non-clinical samples.

Study objectives

The present study was a preliminary investigation of the relationships between negative problem-solving attitudes, self-reported habitual approaches to problem-solving, and interpersonal problem-solving effectiveness to interpersonal dysfunction in a sample of individuals high in chronic worry. Consistent with past research, it was hypothesized that greater interpersonal dysfunction would be associated with greater GAD symptom severity and chronic worry. It was hypothesized that greater overall interpersonal dysfunction would be associated with

greater NPO, impulsive/careless and avoidant problem-solving approaches, and poorer solution strategies in response to scenarios describing interpersonal conflict. In addition, this study sought to provide preliminary support for the supposition that unhelpful problem-solving processes are a mechanism underlying the relationship between interpersonal dysfunction and GAD symptom severity. It was hypothesized that there would be an indirect effect of interpersonal dysfunction on GAD symptom severity through negative problem-solving beliefs and approaches. As an exploratory objective, we also investigated relations between the affiliation and dominance dimensions and GAD symptoms, worry, and problem-solving variables.

Method

Participants

Sixty-three community participants were recruited via online and poster advertisements for a larger unpublished study on worry and correlates of problem-solving quality. Eligible participants were between 18 and 65 years and endorsed chronic worry as indicated by a score of 56 or above on the PSWQ – Trait version (Meyer *et al.*, 1990; Molina and Borkovec, 1994), a cut-off associated with distress and functional impairment (Ruscio, 2002). Four participants no longer scored above 56 on the PSWQ at the laboratory visit and consequently were excluded from the analyses leaving a final sample of $n = 59$ for analysis. The average level of worry in the final sample (mean = 66.9, $SD = 6.1$) was greater than a cut-off that has been found to be suggestive of GAD (Behar *et al.*, 2003). Furthermore, the sample endorsed elevated GAD symptoms (mean = 9.8, $SD = 2.4$) as measured by the Generalized Anxiety Disorder Questionnaire for the DSM-IV (GAD-Q-IV; Newman *et al.*, 2002). The mean level of depression as measured by the Depression Anxiety Stress Scales (DASS-21; Lovibond and Lovibond, 1995; mean = 17.7, $SD = 11.4$) suggested moderate levels of depression in the sample, which is to be expected given that chronic worry is associated with depression (McEvoy *et al.*, 2013b). The majority of the sample reported their sex to be female (59.3%) and one person preferred not to answer (1.7%). The average age of the sample was 31.7 years ($SD = 12.1$). The sample self-identified as follows: 42.4% as Caucasian, 39.0% as East, South or South-East Asian, 6.8% as Black, 3.4% as Arab or West Asian, 1.7% as Latin American, 3.4% as multi-racial and 3.4% indicated they preferred not to answer. The majority of the sample reported being single (79.7%) as opposed to married/common law (16.9%) or divorced (3.4%). Approximately one-third of the sample were currently enrolled in an education programme (35.6%). Of the participants who were not currently enrolled in an education programme, 43.2% reported having an undergraduate degree, 29.7% had a Master's degree, 16.2% had a college degree, and 10.8% had a high school diploma. Lastly, 55.9% of participants reported working full or part time.

Measures

Questionnaires

Inventory of Interpersonal Problems-Short Circumplex (IIP-SC; Soldz et al., 1995). The IIP-SC is a measure of interpersonal problems based on the interpersonal circumplex. Participants are asked to indicate the extent to which each item applies to them on a 5-point Likert scale with higher scores indicating greater interpersonal dysfunction. The total interpersonal distress, affiliation (AFF) and dominance (DOM) scores were calculated for analysis. In the present sample, the IIP-SC subscales were found to have acceptable to good internal consistency ($\alpha = .64$ to $.85$). The IIP-SC has also demonstrated good test-re-test reliability ($r = .83$; Soldz *et al.*, 1995).

Social Problem-Solving Inventory – Revised (SPSI-R; D’Zurilla et al., 2002). The SPSI-R is a measure of two dimensions of problem orientation (positive and negative) and three dimensions of problem-solving style or approach (rational, avoidant, and impulsive/careless). The SPSI-R consists of 25 items rated on a 5-point Likert scale with higher scores indicating that the problem orientation or style is more true for the individual. The SPSI-R has demonstrated good test–re-test reliability ($r=.72$ to $.88$; D’Zurilla et al., 2002) and in the present sample, the subscales were found to have acceptable to good internal consistency ($\alpha=.64$ to $.85$).

Penn State Worry Questionnaire (PSWQ) Trait Version (Meyer et al., 1990). The PSWQ assesses the propensity to worry excessively and uncontrollably. It consists of 16 items rated on a 5-point Likert scale with higher scores indicating greater worry. The PSWQ has been shown to have good test–re-test reliability ($r=.74$ to $.92$; Startup and Erickson, 2006), content and construct validity (Stöber and Bittencourt, 1998), and high internal consistency ($\alpha=.86$ to $.95$; Dear et al., 2011; Molina and Borkovec, 1994).

The Generalized Anxiety Disorder Questionnaire for the DSM-IV (GAD-Q-IV; Newman et al., 2002). The GAD-Q-IV assesses GAD symptom severity. It consists of 14 items, including yes/no questions that assess the excessiveness and uncontrollability of worry and the associated somatic symptoms, and two questions that assess the associated interference and distress, which are rated on a 9-point Likert scale. Participants also list their most frequent worry topics. Total scores range from 0 to 13, with higher scores indicating greater symptom severity. The GAD-Q-IV has good convergent validity with the *Anxiety Disorders Interview Schedule for DSM-IV* (ADIS-IV; $\kappa=.67$) and good test–re-test reliability over a 2-week period ($r=.84$; Newman et al., 2002).

Depression Anxiety Stress Scales (DASS-21; Lovibond and Lovibond, 1995). The DASS-21 is a measure of past-week depression and anxiety symptoms. It consists of 21 items that are rated on a 4-point Likert scale, with higher scores indicating greater anxiety and depression symptoms. The DASS has been shown to have good reliability and convergent validity (Antony et al., 1998). Only the depression subscale was examined in the analyses and the internal consistency for this subscale was excellent ($\alpha=.91$).

Interpersonal Problem-Solving Task. The Means-End Problem-Solving Task (MEPS; Platt and Spivack, 1975) is a performance-based measure of problem-solving ability. Participants were provided with two interpersonal problems as well as the final problem resolutions and were instructed to detail, as much as possible, the steps they would take to get from the beginning to the end of the problem. The two situations involved problems in a romantic relationship and in an employee–boss relationship, respectively. The effectiveness of each problem solution was rated on a 7-point Likert scale, with a score of 1 reflecting an unproductive solution and a score of 7 reflecting an extremely effective solution that would confidently lead to the problem being solved (Lyubomirsky and Nolen-Hoeksema, 1995; Marx et al., 1992; Watkins and Moulds, 2005). Ten per cent of the MEPS scenarios were coded by a second rater to assess inter-rater reliability. The raters agreed in 75% of cases and discrepancies were resolved through discussion.

Procedure

Interested participants first completed an online screen consisting of the PSWQ and a question about age. Eligible participants were invited to the laboratory for a 1-hour visit. Following informed consent, participants completed questionnaires on the computer (PSWQ, GAD-Q-IV, DASS-21 and IIP-SC) and a pen and paper questionnaire (SPSI-R) in random order. Afterwards, participants completed the MEPS and a researcher-administered imagery measure (not part of the present analysis) in counter-balanced order. Participants were debriefed and compensated \$15.

Data analysis

The structural summary method (SSM; Gurtman, 1994) was used to characterize the pattern of interpersonal dysfunction in the sample and to obtain the total interpersonal dysfunction score, which was used in analyses (detailed below). Model 4 of the PROCESS macro (Hayes, 2013) was used to assess the indirect effect of interpersonal dysfunction on GAD symptom severity through negative problem-solving beliefs and approaches (i.e. impulsive/careless and avoidant) using bootstrapped estimates with 10000 samples and 95% confidence intervals (CIs; Shrout and Bolger, 2002).

Data preparation

The IIP-SC data were recoded to a scale of 0–4 and the octant scores were calculated by summing the four items that correspond to each octant. In accordance with data preparation guidelines for SSM (Wright *et al.*, 2009), the subscales were standardized. The college norms (Hopwood *et al.*, 2008) were used for standardization for several reasons. The sample consisted of community participants with an average age of 32 years, 36% reported being currently enrolled in an education programme, and of the participants not currently enrolled in an education programme, 89% obtained a college or university degree. Dominance and affiliation scores were calculated using circumplex weighting procedures (Wiggins and Broughton, 1991).

Structural summary method

The SSM accounts for the circularity of the data and the cosine wave pattern of the octants (i.e. closer octants share more similar features and are more highly correlated than octants that are further away; Gurtman, 1994). To characterize the pattern of interpersonal dysfunction in the sample, the SSM provides four parameters, including elevation, amplitude, angular displacement, and R^2 . Elevation reflects the average dysfunction across the octant scores with greater values representing greater interpersonal distress. Amplitude is indicative of the specificity within a particular interpersonal profile and a value of .15 or greater is suggested to reflect a distinct interpersonal theme (Wright *et al.*, 2012). The angular displacement represents the most prominent interpersonal profile on the circumplex. Lastly, the goodness of fit statistic (R^2) is an index of profile prototypicality, that is, how well the data conform to the anticipated sinusoidal pattern based on the circumplex theory. When the R^2 is less than .7, it is suggested that the interpersonal profile is too complex and amplitude and angular displacement are not interpretable (Gurtman and Pincus, 2003). In this study, SSM parameters were calculated for the entire sample to assess the level and structure of interpersonal problems. Elevation was used in the quantitative analyses to test the hypotheses.

Results

Preliminary analyses

To characterize the interpersonal dysfunction in the sample, SSM analyses were first conducted. The SSM analyses revealed an adequate profile prototypicality ($R^2=.81$). The average interpersonal distress in the sample was found to be high ($e=.61$). Furthermore, the amplitude ($A=0.24$) and angular displacement ($\delta=237$) values suggest that there was a distinctive theme of socially-avoidant and non-assertive dysfunction in the sample.

To test the first hypothesis that greater interpersonal dysfunction would be associated with greater GAD symptom severity and chronic worry, bivariate correlations were conducted (see Table 1). Greater overall interpersonal dysfunction was significantly associated with greater GAD-Q-IV scores but was not significantly associated with worry severity; however, the relationship with worry approached significance ($r=.25$, $p=.054$). In addition, *post-hoc* analysis

Table 1. Means, standard deviation, and correlations between worry, problem solving processes, and interpersonal dysfunction in a sample of people high in chronic worry

	Mean (SD)	e	AFF	DOM	PSWQ	GAD-Q-IV	NPO	ICS	AS	MEPS-EFF
e	.6 (.8)	—								
AFF	-.1 (.7)	-.02	—							
DOM	-.2 (.7)	.01	-.18	—						
PSWQ	66.9 (6.1)	.25	.05	.07	—					
GAD-Q-IV	9.8 (2.4)	.27*	.11	.28*	.34**	—				
NPO	13.2 (3.6)	.50***	-.01	.05	.43**	.42**	—			
ICS	6.8 (4.8)	.44**	-.12	.30*	.14	.24	.36**	—		
AS	10.2 (5.2)	.41**	-.15	.14	.21	.22	.48***	.59***	—	
MEPS-EFF	3.7 (.92)	-.18	.11	-.22	-.07	-.19	.03	-.36**	-.20	—

e, elevation (i.e. total interpersonal dysfunction); AFF, affiliation subscale of the IIP-SC; DOM, dominance subscale of the IIP-SC; PSWQ, Penn State Worry Questionnaire; NPO, negative problem orientation; ICS, impulsive/careless problem solving style; AS, avoidant problem solving style; MEPS-EFF, problem solving effectiveness as assessed used the means-end problem solving task. * $p < .05$, ** $p < .01$, *** $p < .001$.

of the GAD-Q-IV data revealed that 61% of the sample listed interpersonal and relationship concerns as a worry. A point biserial correlation revealed that endorsement of interpersonal worry on the GAD-Q-IV was significantly associated with greater overall interpersonal dysfunction ($r = .35$, $p = .007$). As an exploratory objective, bivariate correlations were conducted to assess the relations between the affiliation and dominance subscales of the IIP-SC and GAD symptom severity and worry (see Table 1). The affiliation dimension was not significantly associated with GAD-Q-IV or worry. Higher scores on the dominance dimension were significantly associated with greater GAD-Q-IV scores; however, dominance was unrelated to worry.

Post-hoc bivariate correlations were also conducted to assess relations between interpersonal dysfunction and depression. Greater total interpersonal dysfunction was significantly associated with greater depression ($r = .57$, $p < .001$). Affiliation and dominance dimensions were unrelated to depression ($p > .05$).

Relations between problem-solving processes and interpersonal dysfunction

To test the second hypothesis that greater overall interpersonal dysfunction would be associated with greater NPO, impulsive/careless and avoidant problem-solving approaches, and poorer solution strategies in response to scenarios describing interpersonal conflict, bivariate correlations were conducted (see Table 1). Greater total interpersonal dysfunction was significantly associated with greater NPO, impulsive/careless problem-solving style (ICS), and avoidant problem-solving style (AS). Total problem-solving effectiveness (MEPS) was not associated with total interpersonal dysfunction, or the affiliation or dominance dimensions. A *post-hoc* analysis was conducted to investigate the relationship between interpersonal dysfunction and problem-solving effectiveness for each type of problem scenario. Partial correlations revealed that poorer problem-solving effectiveness for the 'romantic partner' problem on the MEPS was significantly associated with greater interpersonal dysfunction, controlling for relationship status ($r = -.28$, $p = .037$), whereas this was not the case for the scenario involving a problem with a boss, controlling for employment status ($r = .022$, $p = .870$). Higher scores on the dominance dimension were associated with greater ICS. Lastly, worry and GAD symptoms were significantly associated with NPO but not AS or ICS.

Indirect effect analysis

The indirect effects analysis with NPO as the mediator revealed that greater overall interpersonal dysfunction was significantly associated with greater NPO ($b = 2.34$, $SE = .54$, $p < .001$) and

greater NPO was significantly associated with greater GAD symptom severity ($b = .26$, $SE = .09$, $p = .008$). Greater interpersonal dysfunction was also significantly associated with greater GAD symptom severity ($b = .84$, $SE = .40$, $p = .041$). The indirect effect of NPO on the relationship between interpersonal dysfunction and worry was significant, $b = .61$, $SE = .32$, 95% CI [.12, 1.38]. Accounting for the indirect effect of NPO, the relationship between interpersonal dysfunction and GAD symptom severity was no longer significant ($b = .23$, $SE = .44$, $p = .600$), which supports a full mediation. The total model accounted for 18% of variance in GAD symptom severity ($R^2 = .18$, $F_{2,56} = 6.26$, $p = .004$). In a preliminary test of the hypothesized directionality of the model, the indirect effect analysis was re-run with NPO as the predictor of GAD symptom severity and interpersonal dysfunction as the mediator.¹ Greater NPO was significantly associated with greater interpersonal dysfunction ($b = .11$, $SE = .02$, $p < .001$) and greater GAD symptom severity ($b = .29$, $SE = .08$, $p < .001$). Interpersonal dysfunction did not significantly predict GAD symptom severity with NPO in the model ($b = .23$, $SE = .44$, $p = .600$). The indirect effect of interpersonal dysfunction was not significant, $b = .03$, $SE = .05$, 95% CI [-0.09, .13].

The indirect effect of interpersonal dysfunction on GAD symptoms through ICS was also assessed. Greater overall interpersonal dysfunction was significantly associated with greater ICS ($b = 2.69$, $SE = .74$, $p < .001$); however, ICS was not significantly associated with GAD symptom severity ($b = .08$, $SE = .07$, $p = .294$). Greater interpersonal dysfunction was significantly associated with greater GAD symptom severity ($b = .84$, $SE = .40$, $p = .041$). The indirect effect of ICS was not significant ($b = .21$, $SE = .22$, 95% CI [-0.26, .61]).

Lastly, the indirect effects analysis with AS as the mediator revealed that greater overall interpersonal dysfunction was significantly associated with greater AS ($b = 2.74$, $SE = .82$, $p = .001$) and greater interpersonal dysfunction was significantly associated with greater GAD symptom severity ($b = .84$, $SE = .40$, $p = .041$). However, AS was not significantly associated with GAD symptom severity ($b = .06$, $SE = .07$, $p = .341$) and the indirect effect of ICS was not significant ($b = .17$, $SE = .15$, 95% CI [-0.12, .47]).

Discussion

The present study was a preliminary investigation of the relationship between GAD symptoms, interpersonal dysfunction, and problem-solving processes in individuals high in chronic worry. Consistent with the hypotheses, greater interpersonal dysfunction was associated with greater GAD symptom severity, NPO, ICS and AS. The relationship between interpersonal dysfunction and chronic worry approached significance. The hypothesis that interpersonal dysfunction would be related to effectiveness on an interpersonal problem-solving task was partially supported as greater interpersonal dysfunction was associated with poorer problem-solving effectiveness for the problem involving a romantic partner specifically. In line with our predictions, there was a significant indirect effect on the relationship between interpersonal dysfunction and GAD symptom severity through NPO. However, interpersonal dysfunction and GAD symptom severity were not found to be indirectly related through ICS and AS. These findings are discussed further below.

We first assessed the prominent interpersonal dysfunction style in our sample. The sample was characterized by socially avoidant and non-assertive dysfunction, and thus the findings may be particularly relevant for individuals high in chronic worry with these interpersonal profiles. Consistently, Erickson *et al.* (2016) found that chronic worry as assessed using the PSWQ is associated with non-assertive behaviours, but their sample was also characterized by affiliative dysfunction. However, they studied an undifferentiated undergraduate sample and treatment-seekers, which differs from the present study wherein community participants pre-selected for

¹We would like to acknowledge the anonymous reviewer who offered the suggestion to conduct this *post-hoc* analysis.

elevated chronic worry were recruited. Further research is needed to understand the prototypical interpersonal styles of those with high chronic worry.

Consistent with our predictions, NPO, and greater habitual avoidant or impulsive/careless problem-solving, were statistically associated with greater interpersonal dysfunction. These findings support theories that suggest people high in chronic worry doubt their capacity to solve problems, and engage in inflexible and unhelpful responses when confronted with interpersonal threats (Borkovec *et al.*, 2004b; Newman and Erickson, 2010). Furthermore, these findings provide insight into specific types of inflexible and maladaptive coping (i.e. avoidant and impulsive strategies) associated with interpersonal dysfunction. It is possible that interpersonal problems are exacerbated due to difficulties recognizing the negative impact of the problem-solving approaches and failure to monitor the efficacy of the problem solution and re-adjust their interpersonal behaviour accordingly (Borkovec *et al.*, 2004b; D’Zurilla *et al.*, 2004). Discrepancies between self- and informant reports of interpersonal dysfunction provide preliminary support for the idea that people high in chronic worry may not be aware of the negative impact of their behaviours on others. Specifically, there is evidence that although people high in chronic worry believe they are engaging in overly-nurturant (i.e. caring, supportive) behaviours, informants interpret their behaviours as cold and submissive (Eng and Heimberg, 2006; Erickson *et al.*, 2016). Consistently, there is evidence that people with GAD lack insight into the extent to which they are hostile and submissive in social interactions in a student sample (Erickson and Newman, 2007). The discrepancy between self and informant interpretations of interpersonal behaviours may contribute to significant others responding in a way that is unexpected to the person high in chronic worry (e.g. reciprocating cold behaviours). As such, perceiving that a significant other is unexpectedly upset could also instill doubt about one’s ability to identify and resolve interpersonal problems and perpetuate the use of unhelpful problem-solving approaches in an attempt to mitigate interpersonal distress.

Also in line with our predictions, NPO was found to fully mediate the relationship between interpersonal dysfunction and GAD symptom severity. Furthermore, when the analysis was re-run with NPO as the predictor of GAD symptom severity and interpersonal dysfunction as the mediator, the indirect effect was non-significant. These findings provide preliminary support for Borkovec’s theorizing that childhood attachment-related interpersonal problems contribute to the development of unhelpful beliefs about one’s ability to cope (Borkovec *et al.*, 2004b). That is, engaging in maladaptive interpersonal behaviours and consequently experiencing interpersonal difficulties may lead to the development of negative beliefs about one’s ability to effectively address interpersonal problems. In turn, believing one is ill-equipped to resolve interpersonal difficulties may contribute to relationship problems and consequently exacerbate GAD symptoms, including worry about one’s relationships (Newman and Erickson, 2010). This finding is consistent with a research study in a non-clinical sample that found the relationship between interpersonal conflict and anxiety to be stronger for those higher in NPO (Londahl *et al.*, 2005). Consequently, these findings support the use of existing interventions in CBT for chronic worry and GAD that target doubts about one’s problem-solving abilities to increase self-confidence (e.g. reframing problems as opportunities as opposed to threats; Robichaud *et al.*, 2019). Interestingly, both NPO and insecure attachment are also associated with negative beliefs about one’s capacity to access and implement emotion regulation strategies in samples of individuals high in chronic worry (Marganska *et al.*, 2013; Ouellet *et al.*, 2019). It is possible that negative beliefs about regulating emotions may also contribute to interpersonal dysfunction in people high in chronic worry.

Other maladaptive problem-solving processes, including avoidant and impulsive problem-solving approaches and problem-solving efficacy, were not found to be associated with chronic worry or GAD symptoms. These findings are consistent with past research on problem-solving processes in a sample of individuals high in chronic worry and GAD symptoms (Pawluk *et al.*, 2017) and may have been due to restricted range in the sample.

Future research may wish to investigate the effect of problem-solving approaches and effectiveness on the relationship between interpersonal dysfunction and chronic worry and GAD in a larger undifferentiated sample. Also consistent with Pawluk *et al.* (2017), NPO was unrelated to problem-solving effectiveness on the MEPS. It is possible that although people high in chronic worry doubt their problem-solving abilities, this may not be associated with objective problem-solving deficits. Consistently, beliefs about problem-solving ability have been shown to be more relevant to GAD pathology relative to problem-solving skills (Ladouceur *et al.*, 1998). In addition, there is evidence that problem-solving ability is impacted when individuals high in worry are asked to worry about their problems as opposed to consider them objectively (Llera and Newman, 2020). It is possible that the standardized MEPS problems did not elicit anxiety and consequently led to more effective problem-solving on average than if participants had solved a personally relevant anxiety-provoking problem. Future research should investigate the relationship between problem-solving effectiveness in an anxious state and problem-solving beliefs and interpersonal dysfunction.

In examining specific problem-solving styles and relations with specific dimensions of interpersonal dysfunction, zero-order correlations revealed that a greater general tendency to approach problems impulsively, was associated with a tendency to engage in dominant behaviours (e.g. manipulation, control) in relationships. Whether or not this pattern is theoretically meaningful and specific to chronic worry will need to be examined in further research. Of particular interest is the impulsivity aspect of this finding. There is a small emerging literature demonstrating that chronic worry is associated with elevated negative urgency – the tendency to behave rashly and without much forethought when experiencing heightened negative arousal (Malivoire *et al.*, 2019; Pawluk and Koerner, 2013; Pawluk and Koerner, 2016). In general, there is minimal understanding of the role of impulsivity in chronic worry, given that worry and anxiety are usually viewed as problems of excessive inhibition and avoidance, not disinhibition. The findings of the present study suggest, albeit tentatively, that in individuals high in chronic worry, impulsive problem-solving coincides with dysfunction in the context of relationships and it would be interesting to flesh this out further, e.g. by examining whether interpersonal conflict is especially stressful for people who worry excessively and whether they seek to quickly eliminate problems, even if at a cost, when they occur in this domain.

The association between interpersonal dysfunction and impulsive and avoidant problem-solving may be explained, in part, by relationship insecurities corresponding to anxious and avoidant attachment styles associated with chronic worry (Cooper *et al.*, 1998; Mickelson *et al.*, 1997). People with anxious and avoidant attachment styles are hypervigilant towards social threats, such as abandonment (Mikulincer *et al.*, 2003), and use of maladaptive emotion regulation strategies to reduce distress (Gillath *et al.*, 2005; Marganska *et al.*, 2013). Thus, when faced with an interpersonal threat, people high in chronic worry may be particularly susceptible to intense distress and the proclivity to take rash action may reflect their strong desire to fix the problem quickly in an effort to avert abandonment and reduce distress. In addition, insecure attachment styles are associated with fear of intimacy, which refers to difficulty being open and vulnerable with significant others (Descutner and Thelen, 1991). People high in fear of intimacy are less likely to trust others and seek social support (Descutner and Thelen, 1991) and instead engage in avoidant coping strategies in an effort to protect themselves from loss or rejection (Emmons and Colby, 1995; Thelen *et al.*, 2000). Consequently, fear of intimacy may explain the relationship between interpersonal dysfunction and avoidant problem-solving style. In these ways, avoidant and impulsive/careless problem-solving approaches may reflect maladaptive avoidance and safety behaviours used in an effort to avoid interpersonal threat.

Lastly, the present sample generally provided adequate solutions across the two hypothetical scenarios in the interpersonal problem-solving task, which is consistent with past research

(i.e. Pawluk *et al.*, 2017). Average performance across the ‘romantic partner’ and ‘boss’ scenarios did not correlate with self-reported interpersonal dysfunction, but interestingly, those who endorsed greater interpersonal dysfunction produced poorer solutions in response to the ‘romantic partner’ problem, specifically. This finding suggests that certain interpersonal concerns may be particularly salient for people high in chronic worry. It is possible that concerns of abandonment and feelings of insecurity are heightened in romantic relationships compared with work relationships. As such, greater distress may impair the problem-solving process and increase the likelihood of engaging in maladaptive interpersonal behaviours.

Limitations and conclusions

The findings of this study should be interpreted within the context of its limitations. Given the novelty of the research questions, a cross-sectional study design was employed to conduct a preliminary investigation of the relationships between problem-solving variables and interpersonal dysfunction. Although conclusions cannot be drawn regarding the sequential or causal relationships among the constructs, a cross-sectional approach is a pre-requisite to further exploration using longitudinal or experimental designs. In addition, this study aimed to investigate novel relationships between interpersonal dysfunction and problem-solving in a sample of people high in chronic worry to test and inform theorizing about the development and maintenance of chronic worry and GAD symptoms. However, as a result of investigating these relations in a high worry sample, the restricted range may have resulted in an under-estimation of effects. Furthermore, the sample size may decrease the reliability of the estimates and the results should be interpreted as preliminary. Importantly, this study is hypothesis generating and future research is needed to replicate and extend these findings. In particular, the findings from this study suggest that beliefs people high in chronic worry hold about their problem-solving abilities and strategies are more relevant to interpersonal dysfunction, relative to an objective measure of problem-solving effectiveness for an interpersonal problem.

Furthermore, consistent with the majority of research on interpersonal dysfunction in clinical populations, interpersonal dysfunction was assessed through self-report. While it is informative to understand interpersonal dysfunction as perceived by the participant, there is evidence that people high in chronic worry may not be accurate reporters of their interpersonal experiences. For instance, individuals high in chronic worry have been found to under- or over-report negative interpersonal experiences (Erickson and Newman, 2007) and interpersonal dysfunction as assessed via informant-report has been found to differ from self-report (Erickson *et al.*, 2016; Shin and Newman, 2019). Thus, it may be valuable to also evaluate relations between problem-solving orientation and approach, and interpersonal dysfunction as assessed through informant report. Lastly, 10% of MEPS solutions were coded by a second rater for inter-rater reliability assessment, consistent with past studies (e.g. Glazebrook *et al.*, 2015; Hallford *et al.*, 2018). Future research should consider estimating reliability using a larger number of participants for greater precision.

The present study was a novel investigation of the relations between problem-solving processes and interpersonal dysfunction in individuals high in chronic worry. The findings support the supposition that people’s doubts about their own ability to solve problems, and rigid problem-solving approaches are associated with interpersonal dysfunction and that interpersonal dysfunction is related to GAD symptom severity indirectly through negative beliefs about problem-solving. Furthermore, these findings provide preliminary evidence that in individuals who are high in chronic worry, dysfunctional interpersonal styles may make it difficult to effectively solve conflicts involving intimate or close others. It is proposed that such difficulties probably contribute to continued worry about relationships (e.g. their security or stability). Future research is needed to replicate these findings and to shed light on relations among interpersonal dysfunction, worry, and other worry-related processes.

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Ethics statement. The study procedures were approved by Ryerson University Research Ethics Board (reference no. 2019-423) and adhered to the federal guidelines of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2).

Data availability statement. The data that support the findings of this study are available from the corresponding author, NK, upon reasonable request.

Author contributions. **Bailee Malivoire:** Conceptualization (lead), Formal analysis (lead), Methodology (equal), Writing-original draft (lead), Writing-review & editing (equal); **Naomi Koerner:** Conceptualization (supporting), Formal analysis (supporting), Funding acquisition (lead), Investigation (supporting), Methodology (equal), Supervision (lead). Writing-original draft (supporting), Writing-review & editing (equal).

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