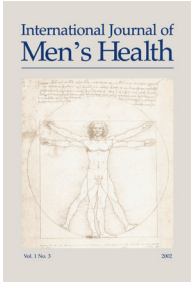

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423-369-2375 (PHONE)
423-369-1125 (FAX)

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A. Kate Fairweather-Schmidt[1,2], Ph.D., Liana Leach[2], Ph.D.,
Peter Butterworth[2], Ph.D., and Kaarin J. Anstey[2], Ph.D.

Infertility Problems and Mental Health Symptoms in a Community-Based Sample: Depressive Symptoms Among Infertile Men, But Not Women

Most researchers agree that men's and women's experiences of infertility are fundamentally different, and impacts upon the nature of psychological distress encountered. However, design flaws, including non-random samples unrepresentative of the general population, compromise many existing studies. Data derived from a random general community sample provides prevalence of current infertility, and permits examination of longitudinal associations between mental health symptoms and infertility among 1,978 participants aged 28-32 years. In the previous 12-months, infertility was experienced by 2.1% and 5.4% partnered men and women. Infertility independently predicted depressive symptomatology in men, and anxiety symptoms among women. Gender differences were sustained, even controlling for prior depression and anxiety. Health professionals are encouraged to proactively enquire about affective symptoms experienced by both women and men with infertility problems.

Keywords: infertility, mental health, general population sample, men's health, gender differences

International estimates suggest nearly 1 in 10 people experience infertility (Boivin, Bunting, Collins, & Nygren, 2007). Rates vary considerably between countries and cultures as Boivin et al. (2007) illustrate, however in developed countries infertility is expected to further increase as delaying childbearing continues (Dunson, Baird, & Colombo, 2004; Sartorius & Nieschlag, 2010). A combination of rising obesity rates, competing career, education and interpersonal demands, and ignorance of the age-related decline in fertility are key protagonists in intensifying rates of infertility (Hammoud, Gibson, Peterson, Meikle,

[1] Flinders University, Adelaide, South Australia.
[2] The Australian National University, Canberra, Australia.

Correspondence concerning this article should be addressed to Kate Fairweather-Schmidt, School of Psychology, Flinders University, GPO Box 2100, Adelaide, SA 5001, Australia. Email: Kate.Fairweather-Schmidt@ flinders.edu.au

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& Carrell, 2008; Schmidt, Sobotka, Bentzen, & Nyboe Andersen, 2012; Virtala, Vilska, Huttunen, & Kunttu, 2011; Wang, Davies, & Norman, 2002).

Importantly, the experience of infertility is frequently described to be a major life stress (Abbey, Andrews, & Halman, 1995). Indeed, some conceptualise infertility as a crisis "caus[ing] both physical and psychological stress" (Sreshthaputra, Sreshthaputra, & Vutyavanich, 2008, p. 1769). However, while there is an extensive body of literature focusing on women's distress and psychological symptomatology in relation to infertility, there remains a much smaller focus on men with infertility problems and their current mental health status (Fisher & Hammarberg, 2012).

GENDER AND INFERTILITY

Frequently, only one person within a couple is medically diagnosed as infertile (Jordan & Revenson, 1999); that is, where pregnancy has not been achieved after 12 months attempting to conceive (Mosher & Pratt, 1991). Research highlights that women are consistently more likely to instigate investigations into infertility issues, commonly attending initial clinical investigations alone (e.g., Greil, Leitko, & Porter, 1988; Meerabeau, 1991). This may be a consequence of differences in the physical and social awareness of fertility. Post puberty, the majority of women are regularly reminded of their integral role in reproduction by menstruation (Foster, 1996), and variation from a woman's "normal" menstrual cycle is usually apparent to her. Further, a "pervasive naturalisation and normalisation of motherhood…" (p. 333; Throsby & Gill, 2004) impels women to become mothers (Culley, Hudson, & Lohan, 2013). In contrast, men are generally reliant on information from their partner to establish their own procreative status (Marsiglio, 1998), and contrastingly, fatherhood appears to be less central to the male social identity (Greil, Leitko, & Porter, 1988) where social normalcy for men is still achievable via alternative pathways, such as successful careers.

Infertility is "a fundamentally different experience for women ... [and] men" (Greil, Slauson-Blevins, & McQuillan, 2010a, p. 141). The process of discovering a fertility problem, perspectives on courses of action, and possibly subsequent infertility treatment, vary with both biological sex, and gender role and identity (Hudson & Culley, 2013; Marsiglio, 1998). Marsiglio (1998) highlights, relative to women, men are more likely to regard the process of detection and help-seeking for a fertility problem as personally affronting. Gender literature posits that men's response to infertility is influenced by the conceptual connection between the ability to procreate and the embodiment of virility/hegemonic masculinity (see also: Connell, 1995; Culley et al., 2013; Dudgeon & Inhorn, 2003, Throsby & Gill, 2004). Putatively, men tie fertility with gender role identity more closely than with fatherhood (either biological or social fathering; Fisher, Baker, & Hammarberg, 2010). In contrast, women's gender identity is entwined with motherhood to such an extent as to define women personally and socially disparate if they do not undertake a maternal role (Abbey, Andrews, & Halman, 1991; Becker, 2000; Nachtigall, Becker, & Wozny, 1992; Thompson, 2005). These stereotypic roles are both prescribed and reinforced by prevailing social norms (and language) and, as Meerabeau (1991) points out, are "reflected in the verbs "to mother" which connotes long term nurturance, and "to father"... refers to the act of procreation" (p. 405).

Social Norms, Infertility and Stigma

In most societies, bearing children is highly normative (Slade, O'Neill, Simpson, &

Lashen, 2007), while childlessness is viewed as unusual or even "socially deviant." Further, involuntary childlessness is stigmatised by societies globally (Marsiglio, 1998). Empirical studies have also identified "stigma" in association with infertility status (e.g., Berg, Wilson, & Weingartner, 1991; Donkor & Sandall, 2007; Dudgeon & Inhorn, 2003; Schmidt, 2009; Whiteford & Gonzalez, 1995), where stigma is described as a negative sense of social difference from others that is divergent from the socially determined norm, and is "deeply discrediting" (Goffman, 1963, p. 4). Thus, the choice to disclose a diagnosis of infertility can be fraught: revealing one's infertility is exposing a "malfunction," while concealing infertility suggests that a choice has been made to remain child-free (Slade et al., 2007). This corresponds with a significant body of research suggesting that, more broadly, illness groups (i.e., labelled or diagnosed; physical or mental) are perceived negatively by society, from the standpoint of both sufferers and non-sufferers, and are clearly influenced by social norm relevant identities (Jetten, Haslam, & Haslam, 2012; see also Greil et al., 2010a).

Mental Health and Infertility

Literature indicates a nexus between infertility and mental health/emotional distress, both in the short and the long term (e.g., Cousineau & Domar, 2007; Fisher, et al., 2010). Infertility is considered a multi-faceted stressor, that is often exceptionally emotionally demanding, to the extent that it precipitates high levels of distress, and symptoms and disorders of anxiety and depression (Greil et al., 2010a; Klemetti, Raitanen, Sihvo, Saarni, & Koponen, 2010; Sreshthaputra, et al., 2008). Reference to gender differences in the experience of distress is widely cited (Greil, et al., 2010a). Frequently, studies identify women with infertility issues as reporting physical and mental health complaints, including affective and anxiety symptoms/disorders and complicated grief (Peloquin & Lafontaine, 2010; Volgsten, Skoog Svanberg, Ekselius, Lundkvist, & Sundström Poromaa, 2008). Problematically, there is only a relatively small body of literature investigating potential impacts of infertility on men, possibly due to a historically-driven women-centred perception of infertility (Carmeli & Birenbaum-Carmeli, 1994). Further, sample related issues have arisen due to men with male-factor infertility being less likely to participate in research (Volgsten et al., 2008). Nevertheless, Volgsten et al. (2008) identified a greater prevalence of mood disorders among infertile men than their general population counterparts. While this does not suggest psychopathology is a causal factor in infertility, infertility-related stress may subsequently impact on fertility (Greil et al., 2010a).

The association between infertility problems and coping strategies has also been well reviewed. Here, gender differences are also observed, where accessing social coping resources, such as family or partner support, attenuates infertility stress among women (Gibson & Meyers, 2002). In contrast, longitudinal research suggests that the social coping resources of men experiencing infertility problems appear to become more negative and less supportive over time (Peronace, Boivin, & Schmidt, 2007). Further, there is good evidence of a bi-directional relationship between social suffering and psychological health (DeLongis, Folkman, & Lazarus, 1988).

Stigma, Mental Health and Help-Seeking Behaviour Among Men and Women

Individuals suffering mental health problems experience stigma endemically and cross-culturally (Abdullah & Brown, 2011; Donkor & Sandall, 2007 in relation to infertility; Wahl, 1999). Further, gender differences are also evident here too, where men with mental

health problems are perceived by those without mental illness problems to be more dangerous or unpredictable than women with mental health issues (Judd, Komiti, & Jackson, 2008; Reavley & Jorm, 2011). Research also highlights that men who maintain hegemonic masculine attitudes are more reticent toward help-seeking, as vulnerability (i.e., help-seeking) is seen to be a sign of femininity, and threatens appearance of stoicism and emotional restraint (stigmatised and should be avoided; Robertson & Fitzgerald, 1992; Throsby & Gill, 2004; Wenger, 2011; Wischmann & Thorn, 2013). Concerted efforts are being undertaken to destigmatise mental illnesses, particularly depression in Australia (e.g., Jorm, Christensen, & Griffiths, 2006), but nevertheless, fear of stigma continues to thwart help-seeking activities of men (Möller-Leimkühler, 2002).

Methodological Limitations and Potential Ramifications

Notwithstanding the aforementioned issues, a number of methodological factors have also substantially hindered progress toward gaining an accurate representation of the mental health status among community-based men with current infertility problems (Slade et al., 2007; Whiteford & Gonzalez, 1995). In particular, these constraints include samples being frequently drawn from infertility clinics, infertility support groups or IVF programs—which are predominantly female (particularly in relation to mental health; Klemetti et al., 2010). In their recent review, Greil et al. (2010a) highlight that it is unlikely that the broader general population possess characteristics equivalent to the clinical groups (Greil, 1997; Greil, et al., 2010a). Very few studies have utilised general population-based samples (but see Klemetti et al., 2010), particularly in a younger age group, as infertility is often only discovered in the mid-30s. Further, Greil et al. (1997) highlight infertility research using cross-sectional designs is problematic as infertility often has a protracted course. This study investigates differences in symptoms of depression and anxiety between men and women currently experiencing infertility with a modest sample size. However, although the sample was not large, there remained the opportunity to address other methodological limitations of previous work, such as non-community-based samples, and cross-sectional designs.

THE CURRENT STUDY

This investigation seeks to identify whether current infertility problems are significantly associated with mental health symptoms (depression and anxiety) for men and women in partnerships, sampled independently (i.e., this analysis does not utilise couples data) from a community-based sample. Specifically, the present study has two objectives (1) to provide 12-month prevalence and descriptive statistics for partnered men and women aged 28-32 years reporting presence or absence of current infertility problems; and (2) using both cross-sectional and longitudinal models, to elucidate the relationship between current infertility problems and current symptoms of depression and anxiety among partnered men and women, after accounting for known covariates, including controlling for past symptoms of depression and anxiety.

METHODS

Participants

The PATH Through Life Project is undertaken at the Centre for Research on Ageing, Health and Wellbeing, The Australian National University (Anstey et al., 2012). The PATH

Survey is a longitudinal study and the project protocol involves re-interviewing participants every four years from 1999 until 2019. The original aims of the study were to (a) describe the course of depression, anxiety, substance use and cognitive capacity as individuals; (b) to distinguish environmental and genetic risk factors impacting individual-based factors and characteristics; and (c) to investigate associations across time between the domains of depression and anxiety, substance use, and cognitive ability and dementia (Anstey et al., 2012, p. 1). Participants were initially identified via a random sample from the Australian Electoral Roll, where enrolment is compulsory in Australia. All prospective participants for the PATH survey were residents of either Canberra (Australian Capital Territory; ACT) or the neighbouring town of Queanbeyan (New South Wales). Inclusion criteria required individuals to be aged in one of three age brackets at baseline (Wave 1; 1999), 20–24, 40–44 or 60–64, and to possess proficiency in English to engage and respond to the interview process. The current study sample constituted participants aged 28–32 years at Wave 3. This age range is younger than most studies investigating infertility. Data from Wave 3 were used for the primary analyses as this wave contained information on infertility status. Data from Wave 1 were used to adjust for participants' prior mental health status. Importantly, men and women were sampled independently (not partnered data). For Wave 1 (commenced 1999; completed 2001), the participation rate was 58.6% for those aged 20–24. At Wave 3 this cohort was aged 28-32 (commenced 2007; completed 2008) and maintained 82.3% of the group initially interviewed at Wave 1. At Wave 1 there were 1,009 men and 1,119 women; Wave 3 retained 920 men and 1,058 women. To improve comparability, only partnered participants at Wave 3 were included in the current analyses, constituting 608 men and 741 women. Fifty-three (3.9%) of these participants reported current fertility problems (men $n = 13$; women $n = 40$).

Design

Approval of The PATH Through Life Project protocol was granted by The Australian National University Human Research Ethics Committee (no. M9807; 01/09/1998), and this study by The University of Adelaide Human Research Ethics Subcommittee (no. 10/81; 23/07/10). While more comprehensive information of PATH participants and survey methodology, and measures have been provided previously (Anstey et al., 2012), in précis, participants agreeing to take part in the project were assessed in their home or The Australian National University. The majority of the interview was self-completed on a laptop computer using commercial software for computer-assisted personal interviewing. PATH Project participants completed a questionnaire that, amongst other domains, incorporated sociodemographic characteristics, personality, physical and mental health, and social environment. PATH survey methodology allows participants to respond to questionnaire items in a highly confidential manner using laptop computers, potentially avoiding social desirability bias or issues relating to stigma. This is important as research highlights the impact of stigma detrimentally impacts the capacity to quantify (i.e., true prevalence) and characterise those experiencing of infertility and mental health data (Whiteford & Gonzalez, 1995; Wahl, 1999).

Measures

Sociodemographic variables included age, household income (1 = less than or equal to $300 per week; 2 = greater than $300 to less than or equal to $575 per week; 3 = greater than

$575 to less than or equal to $1075 per week; 4 = greater than $1075 to less than or equal to $1700 per week; 5 = greater than $1700 to less than or equal to $2400 per week; 6 = greater than $2400 per week) and education (total years studying). Participants were also asked if they had any previous children (it was necessary to add this variable as a covariate rather than excluding those with previous children, to maximise the sample size available).

Life satisfaction was measured using the Satisfaction with Life Scale ($\alpha = 0.91$; Diener, Emmons, Larsen, & Griffin, 1985). Relationship and life stressor variables included the number of life events in the last six months (Brugha & Cragg, 1990), and a scale ascertaining the level of negative interactions with family and friends. The two scales addressing negative interactions with family ($\alpha = 0.78$) and friends ($\alpha = 0.71$) had acceptable alphas (Schuster, Kessler, & Aseltine, 1990). A substance use measure assessed alcohol consumption (Alcohol Use Disorders Identification Test scale; Saunders et al., 1993).

Current infertility problem items identified whether respondents had experienced infertility for longer than 1 year and whether this was currently a problem (Women: "Have you ever tried to become pregnant for more than one year without achieving a pregnancy? Is this currently a problem for you?"; Men: "Have you ever experienced a problem with infertility for more than 1 year? Is this currently a problem for you?"). It is important to highlight that participants who may have had infertility problems in the past were excluded from this group, but integrated with participants without infertility problems. This was necessary to identify the proximal, rather than distal, effects of infertility.

Importantly, self-report of infertility indicates that these PATH participants perceive themselves as infertile (i.e., analogous to Greil & McQuillan, 2004: "sub-fecund with intent"). This represents a crucial distinction from pragmatic clinical guidelines determining individuals to be infertile after 12 months of attempting conception without achieving pregnancy (Mosher & Pratt, 1991). Putatively, *the act of considering oneself as infertile* (no matter whether it accords with the recognised time-based definition, or for that matter a clinical diagnosis) is likely to result in the self-described infertile group being more similar in their mental health symptomatology. Reducing group heterogeneity in this way should support detection of effects (further discussion on self-perception, see Greil et al., 2010b).

The outcome variables, depression and anxiety, were assessed by the Goldberg Depression and Anxiety Scales (Goldberg, Bridges, Duncan-Jones, & Grayson, 1988). Both scales were found to have satisfactory internal reliabilities for the present sample ($\alpha = 0.81$ and $\alpha = 0.78$, respectively). These scales were modelled independently to identify predominantly depressive or anxiety-related symptom outcomes.

Data Analysis

Multivariate linear regression predicted mental health problems (i.e., symptoms of depression or anxiety) among partnered participants aged 28–32 years. Separate regressions were run with anxiety and depression as dependent variables (totalling four models). Importantly, the first set of models (Model 1) only included Wave 3 variables. Subsequently, a second set of models (Model 2) included depression or anxiety measures assessed at Wave 1. Few participants would have been aware of or have experienced infertility problems when responding at Wave 1 owing to the fact that they were aged 20–24 years. This permits the present analyses to control for pre-existing depression and/or anxiety (i.e., at Wave 1, prior to the emergence of infertility problems) at Wave 3, when infertility data were collected. Importantly, this was not done to investigate causality, but only to avoid previous mental health issues confounding results. All analyses were undertaken using PASW Version 20.

RESULTS

Descriptive statistics are provided by fertility status and gender in Table 1. Among partnered men, 2.1% (n = 13) were experiencing current infertility problems, contrasting with 5.4 % (n = 40) of partnered women. Women with current infertility problems had significantly lower life satisfaction, fewer years of education, and higher levels of anxiety relative to women without fertility issues. Similarly, men had significantly lower life satisfaction, but higher levels of depression, compared to men without current infertility problems. Men with currently fertility problems also consumed less alcohol. Notably, the majority of the sample consisted of participants who had sought medical help for their infertility problems (85%, n = 11 and n = 34 for men and women, respectively).

Tables 2 and 3 detail findings of Models 1 and 2 linear regressions for Wave 3 depression and anxiety (respectively), including current infertility. Importantly, when the total sample is analysed, and variables known to influence depression and anxiety are held constant, it would appear that infertility has no association with depression or anxiety. However, as Table 1 suggested of different patterns of depression and anxiety for men and women, interactions between gender and infertility were formally tested in all regression models. As shown in Table 2 and 3, significant gender interactions were found for both depression [β = -.19 (b = -1.21; 95% Confidence Interval [CI] = -2.23 to -0.20), $p < .05$], and anxiety [β = .19, (b = 1.40; 95% CI = 0.26 to 2.55), $p < .05$]. The relationship of infertility with depression by gender depicted in Figure 1 is confirmed when the sample was split by gender and analysed separately (data not shown); it is evident that even when accounting for baseline depression (8 years earlier) infertility makes a significant independent contribution to depression for men (β = 0.07 (b = 1.06; 95% CI: 0.21 to1.91)]. Similarly, Figure 2 demonstrates that for women, current infertility independently accounted for variance in anxiety symptomatology [β = 0.06 (b = 0.67; 95% CI: 0.07 to 1.27)].

DISCUSSION

Utilising data derived from a community-based survey and employing both cross-sectional and longitudinal methodologies, the current study sought to investigate prevalence of infertility, and concurrency of infertility (presence/absence) with mental health symptoms among partnered men and women. Prevalence of current infertility problems (2.1% and 5.4% for men and women, respectively) are somewhat lower than is typically reported in the literature (although in a recent review prevalence rates vary considerably; Gurunath, Pandian, Anderson, & Bhattacharya, 2001), and is likely to relate to the relatively young sample. Table 1 highlights the mean age of those with current infertility problems is greater compared to those without infertility problems for this sample. Notably, men with infertility problems were found to have the greatest mean level of depression compared to all other groups regardless of gender and infertility status (Table 1). The analyses also revealed an equivalent proportion (85%) of men and women reported having sought some kind of help for infertility. This does not concord with the majority of previous literature, which identifies women are the primary help/treatment-seeking drivers (e.g., Becker & Nachtigall, 1994; Daniluk, 2001; Throsby & Gill, 2004; cf. Dyer, Abrahams, Mokoena & van der Spuy, 2004). It is possible that population characteristics, such as greater levels of education, income, health insurance and service availability (e.g., White, McQuillan & Greil, 2006) may have underpinned help-seeking behaviour in this sample.

Importantly, a key strength of this investigation is that participants were randomly drawn from the general community. This means results are not confounded by selection bias specif-

Table 1
Descriptive Characteristics by Fertility Status for Partnered Men and Women Without Children (% or Mean (SD))

	Males		**Females**	
Variable	No current fertility problems (*N* = 595)	Current fertility problem (*N* = 13)	No current fertility problems (*N* = 701)	Current fertility problem (*N* = 40)
Socio-demographic factors				
Age (years)	30.73 (1.50)	31.46 (1.33)	30.74 (1.49)	31.18 (1.30)
Education (years)	15.31 (1.64)	14.90 (1.49)	**15.57 (1.66)**	**14.71 (1.66)***
HH income /week (Bands 1-6[a]) =	4.69 (1.15) $1700-2400	3.92 (1.81) $1075-1700	4.52 (1.21) $1700-2400	4.55 (1.06) $1700-2400
Have children (yes)	50.3%	30.8%	58.3%	50.0%
Lifestyle factors				
Number of negative life events (0-16)	1.06 (1.31)	1.77 (2.39)	1.15 (1.43)	1.43 (2.11)
Overall life satisfaction (5-35)	**27.25 (5.72)**	**23.92 (7.16)***	**28.38 (5.37)**	**25.30 (7.87)****
Support factors				
Negative support family (0-9)	3.38 (1.87)	3.15 (1.95)	3.70 (2.03)	4.25 (2.11)
Negative support friends (0-9)	2.71 (1.65)	2.92 (2.02)	2.54 (1.64)	2.38 (1.39)
Current mental health (Wave 3)				
AUDIT	**6.18 (4.86)**	**3.15 (3.02)***	3.57 (3.65)	3.14 (3.17)
Anxiety (0-9)	3.00 (2.55)	3.15 (3.08)	**4.03 (2.60)**	**4.97 (2.63)***
Depression (0-9)	**2.03 (2.19)**	**3.46 (3.21)***	2.76 (2.29)	3.38 (2.63)
Past mental health (Wave 1)				
Anxiety (0-9)	3.06 (2.55)	3.31 (3.40)	4.28 (2.63)	4.25 (2.73)
Depression (0-9)	2.37 (2.16)	2.85 (2.97)	2.95 (2.35)	3.33 (2.50)

Note: *$p < .01$; **$p < .001$.
Differences between the no current fertility problem and fertility problem groups were tested using Chi-square for categorical covariates and independent samples t-tests for continuous covariates (stratified by gender).
[a] = 6 income continuous income bands. See Methods section above for more description.

ically impacting findings concerning infertility, a methodological shortcoming that many other infertility studies using clinical samples encounter (Greil et al., 2010a). A further strength is that relationships between independent and dependent variables reported in Model 2 are not biased by the influence of previous depression and anxiety symptoms as these are statistically controlled. Thus, results emphasise the temporal proximity of current infertility problems and the occurrence of current symptoms of depression or anxiety. This permits and validates the following commentary exploring the impact of model predictors, including infertility problems, on the occurrence of depressive and anxiety symptomatology within a sample of males and females of childbearing age.

Table 2
The Role of Selected Demographic, Health and Social Characteristics on Depressive Symptomatology Among Partnered Males and Females

Variables	Model 1β (b; CI)	Model 2β (b; CI)
Socio-demographic factors		
Gender (female)	.06 (.27; .07-.46)*	.05 (.23; .04-.42)*
Age (years)	.02 (.04; -.02-.10)	-.05 (-.02; -.01- .11)
Education (years)	-.06 (-.08; -.14- -.02)*	-.04 (-.06; -.12-.001)
HH income /week (bands)	-.06 (-.12; -.19- -.04)*	-.05 (-.10; -.18- -.02)*
Have child(ren) (No)	-.02 (-.08; -.28-.12)	-.01 (-.05; -.29-.014)
Life factors		
Life events (0-16)	.04 (.07; -.01-.14)*	.04 (.06; -.01-.12)
Life satisfaction (5-35)	-.17 (-.07; -.09- -.05)**	-.17 (-.07; -.09- -.05)**
Support factors		
Negative family support (0-9)	-.01 (-.01; -.04-.06)	-.01 (-.01; -.06-.05)
Negative friends support (0-9)	-.03 (.04; -.10-.02)	-.03 (-.04; -.10-.02)
Current infertility problems	.01 (.06; -.40-.06)	.01 (.06; -.40-.51)
Mental health		
AUDIT	.02 (.01; .01-.03)*	.01 (.01; -.02-.03)
Current Wave 3 Anxiety (0-9)	.60 (.52; .48-.56)**	.57 (.50; .46-.54)**
Past Wave 1 Depression (0-9)	-	.11 (.11; .07-.16)**
Interaction term		
Infertility*Gender	-.20 (-1.26; -2.29- -1.23)*	-.19 (-1.21; -2.23- -.20)*

Note: *$p < .05$; **$p < .001$; β = standardised regression coefficient; b = unstandardized regression coefficient; CI = Confidence Intervals; *Model 1*: Wave 3 variables only; *Model 2*: Includes depression assessed at Wave 1.

In accordance with other recently published literature (Klemetti et al., 2010), multivariate models employed by this study identify differences across gender in the nature of distress experienced concurrently with infertility problems. For men, after adjusting for shared variance attributable to other variables (including demographics, anxiety, life events, life satisfaction, alcohol use), a significant independent effect of current infertility problems was observable in relation to depression. Further, the strength of this effect remained relatively stable even when controlling for prior depression (i.e., present at Wave 1, 8 years earlier). Arguably, this infers current infertility for men in this study is *intrinsically* depressing, rather than depressive affect arising from an amalgamation of current infertility with recent negative social interactions, recent life events, and satisfaction with life or anxiety symptoms. Some would contest that this depressive symptomatology directly relates to the notion that infertility challenges males' self-concept of masculinity (e.g., hegemonic masculinity, which includes virility; Berg et al., 1991; Dudgeon & Inhorn, 2003; Edelmann, Humphrey, & Owens, 1994).

Of further interest was the contrast between results for men and women. Models indicated an absence of any (either multi- or univariate) associations of current infertility with de-

Table 3
The Role of Selected Demographic, Health and Social Characteristics on Anxiety Symptomatology Among Partnered Males and Females

Variables	Model 1β (b; 95% CI)	Model 2β (b; 95% CI)
Socio-demographic factors		
Gender (female)	.11 (.58; .36–.80)**	.08 (.40; .18–.62)**
Age (years)	-.05 (-.09; -.16– -.20)*	-.05 (-.09; -.16– -.02)*
Education (years)	.07 (.12; .05–.18)*	.08 (.13; .06–.19)**
HH income/week (bands)	.03 (.07; -.12–.17)	.03 (.07; -.02–.16)
Have child(ren) (No)	.00 (.02; -.20–.25)	.00 (.00; -.22–.22)
Life factors		
Life events (0-16)	.16 (.09; -.08–.23)**	.07 (.13; .05–.20)*
Life satisfaction (5-35)	-.07 (-.03; -.05– .-01)*	-.06 (-.03; -.05– -.01)*
Support factors		
Negative support family (0-9)	.10 (.13; .07–.19)**	.07 (.10; -.04–.16)*
Negative support friends (0-9)	.06 (.09; .02–.16)*	.04 (.07; -.002–.13)
Current infertility problems	.02 (.22; -.30–.74)	.02 (.29; .22–.79)
Mental health		
AUDIT	.03 (.02; -.01–.04)	.03 (.02; -.004–.04)
Current Wave 3 Depression (0-9)	.60 (.68; .63–.73)**	.56 (.64; .59–.69)**
Past Wave 1 Anxiety (0-9)		.18 (.18; .13–.22)**
Interaction term		
Infertility*Gender	.19 (1.39; .21–2.57)*	.19 (1.40; .26–2.55)*

Notes: *p < .05; **p < .001; β = standardised regression coefficient; b = unstandardized regression coefficient; CI = Confidence Intervals; *Model 1*: Wave 3 variables only; *Model 2*: Includes depression assessed at Wave 1.

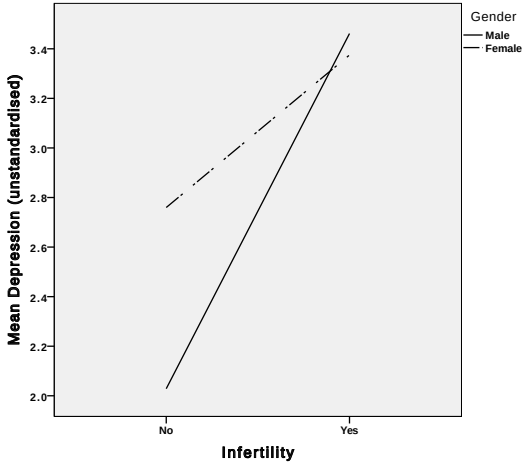

Figure 1. Interaction between mean Goldberg depression, infertility and gender.

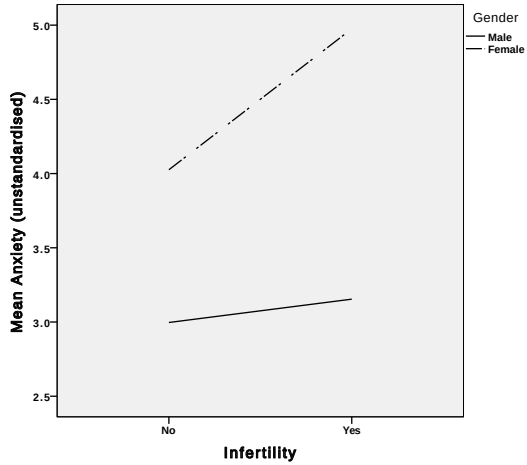

Figure 2. Interaction between mean Goldberg anxiety, infertility and gender.

pression for female participants. As the majority of this sample was seeking/had sought medical help (indicating infertility issues remained contemporaneous), it suggests depression is not commonly experienced during this timeframe among women in the sample. In addition to an absence of depressive symptoms, results demonstrated when current infertility was entered in a multivariate model, it significantly predicted anxiety among women. This effect among women is in accordance with other studies addressing anxiety (see Peloquin & Lafontaine, 2010). Importantly, previous research has noted the association between infertility problems and anxiety, satisfaction with life, life events and social support (McEwan, Costello, & Taylor, 1987; Peloquin & Lafontaine, 2010; Sreshthaputra et al., 2008). On the basis of their recent review, Peloquin and Lafontaine (2010) suggest that low satisfaction with the social networks and supports available to individuals with infertility problems is related to the expression of anxiety symptomatology.

Present study outcomes also provide a basis for theorising about issues encountered by infertile men and women in a community sample. For male PATH participants, results suggest acuteness of infertility closely relates to affective symptoms, perhaps as the challenge to their masculinity is more immediate. It is also possible that the aforementioned symptoms are associated with men seeking help (particularly when help-seeking is perceived as unmasculine) for infertility problems. A recent longitudinal study (Greil, McQuillan, Lowry & Shreffler, 2011) highlighted a general population sample women experienced additional levels of distress above and beyond the state of being infertile. Presently, however, no analogous research has been undertaken in a sample of infertile men. Crucially, as the present investigation identified a gender disparity in affective responses related to infertility, it is unclear as to whether men would respond similarly (Greil et al., 2011). Future research is planned to address this issue using two waves of infertility data. In contrast to men, results indicate women newly experiencing infertility are more likely to report anxiety (e.g., fear of failure) when attempting to achieve pregnancy (Berg et al., 1991; Peloquin & Lafontaine, 2010).

Despite the statistical significance of the findings, the effect sizes of infertility on mental health symptoms should be contextualised. In comparison to the other model predictors,

infertility contributed a modest proportion of the total variance in current anxiety and depressive symptomatology. Other more influential predictors included life satisfaction, past depression and anxiety, and negative support from friends. Interestingly, existing research suggests that infertility also impacts life satisfaction and fulfilment (Fisher et al., 2010), and need for social support (especially women; Sreshthaputra et al., 2008). It is therefore fair to suggest that infertility may operate as a precipitant for many of the aforementioned issues, which then become intertwined in the (gendered) life experience of people with infertility problems.

Corresponding investigations using clinical/infertility treatment samples (e.g., Shapiro, 2009) identify disparity between male partners' experience of infertility relative to that of their female partner. Numerous investigations highlight the extent to which medical interventions focus on the female partner (e.g., Carmeli & Birenbaum-Carmeli, 1994; Cousineau & Domar, 2007; Culley et al., 2013). Indeed, a significant proportion of female-centred procedures treat both female-and male-orientated infertility problems. For example, ovarian hyper-stimulation followed by intrauterine insemination (IUI); *in vitro* fertilisation (IVF); gamete/zygote intrafallopian transfer (GIFT/ZIFT), or intracytoplasmatic sperm injection (ICSI) can increase success of conception among women for semen deficiencies (Hull, 1994).

All of these treatments engage women in procedures that are invasive, both physiologically and psychologically, and highlight that in the majority of situations, women are the physical locus of infertility treatment (e.g., Guerra, Llobera, Veiga, & Barri, 1998; Shapiro, 2009). However, despite men's integral role in the fertilisation process, they are often sidelined (Inhorn & Birenbaum-Carmeli, 2008; Meerabeau, 1991; Throsby & Gill, 2004). Understandably, apart from decisions about treatment continuation, men may consider themselves in a position of little influence. This distinct lack of agency is incongruent with traditional and stereotypical male role expectations of instrumentality or control (Deaux, 1985; Hudson & Culley, 2013).

Thus, the contrasting nature of female versus male treatment roles (Dooley, Nolan & Sarma, 2011; Hudson & Culley, 2013) in relation to infertility problems may provide one plausible link between the gender differences and their dissimilar affective responses to issues of infertility (Berg et al., 1991; Greil et al., 1988;). For example, women describe heightened psychological distress in relation to medical procedures/drug therapy, and anxiety relating to a continuation or reversion to a normal menstrual cycle (threat of failure; Berg et al., 1991; Greil, McQuillan, Lowry, & Shreffler, 2011; Wischmann & Thorn, 2013). Divergently, men report feelings of exclusion and disconnection from treatment processes; being unentitled to their own stress reactions (especially when their partners are subjected to the majority of the medical interventions); and discordance with the support-givers' role (Berg, et al., 1991; Dudgeon & Inhorn, 2003; Shapiro, 2009; Thompson, 2005; Verhaak et al., 2007).

Plausibly, the constellation of emotional responses (including depression) to infertility described by involuntarily childless men may also relate to the psychological and physiological ramifications of infertility on their female partners, rather than just their own experience of infertility (Berg et al., 1991; Culley et al., 2013; Dudgeon & Inhorn, 2003; Shapiro, 2009; Verhaak et al., 2007; Wischmann & Thorn, 2013). From this perspective, the relationship between current infertility and depression reported by men in this study may be representative of the gender differential in orientation toward and experience of infertility (and possibly the subsequent emotional demands and stresses placed upon them as support-giver for their partner; Greil et al., 1988, Hudson & Culley, 2013; Wischmann & Thorn, 2013).

Similarly, symptoms of anxiety among their female counterparts are understandable when considering the contiguous nature of the infertility treatments. Psychological uncertainty (of conception) and the perceived lack of control over their own physicality, in addition to cultural expectations for women to bear children, is justifiably distressing (Cousineau & Domar, 2007; Peloquin & Lafontaine, 2010). Clearly, further research focused on the scientific validation of the aforementioned arguments will assist progress in the domain of mental health and infertility for men in particular, but also women.

Health professionals are encouraged to note the importance of considering life events, current levels of distress and perceived lack of support when undertaking risk assessments for mental health problems among clients with infertility problems. Further, the gender-wise focus of this study underscores the relevance of adopting a gender-tailored approach and contexts (e.g., Wischmann & Thorn, 2013) when consulting heterosexual couples seen jointly or individually. The differing mental health symptomatology profiles and trajectories for infertile men and women undergoing infertility treatment represent other key issues for health professionals to investigate. In particular, male clients may need more encouragement to disclose details about their current mental health status.

Limitations

Study limitations should be noted. These data did not identify whether the PATH participant or their partner was infertile, or whether both partners were responsible for the infertility issues. It may be that the person responsible for the infertility (if this information is known) suffers a greater impact on their mental health. Differences in interpretation and acknowledgment may have resulted as a consequence of infertility items in the PATH Survey being worded differently for men and women. Further, the cross-sectional nature of the infertility data did not permit investigation of the infertility *treatment* effect (as opposed to infertility per se). Study findings were also limited by a greater proportion of the infertile group having sought help for their infertility, the mean age being relatively young for studies investigating infertility, and a lack of available data detailing ethnicity and sexuality. The small size of the *currently infertile* group impacted the size of effects detected, and by necessity to include participants who had children already (although reported current infertility problems) and suggest studies with larger samples are required to confirm these findings. Notwithstanding this, it was possible to assess and exclude or control for the effects of age, education, parenthood, income, life events, support from family and friends, and past symptom levels of anxiety and depression, alcohol use and still detect significant differences in current levels of depression, and to some extent anxiety, in relation to current infertility. Prevalence of currently infertile participants in the present study was also found to approximate rates from another Australian cohort study investigating lifetime prevalence of infertility problems (Herbert, Lucke, & Dobson, 2012).

Conclusions

The current study is one of the first to utilise a random representative sample of the general community to investigate the relationship between infertility and mental health in both men and women, adjusting for past mental health. Findings from this investigation highlight psychological difficulties suffered by men in the broader community, of which little is known relative to their female counterparts. Results indicate that mental health problems occur proximal to the experience of infertility for both genders, at a time where much of the

focus is necessarily upon the woman. As a consequence, men with current infertility issues are often poorly understood, acknowledged or supported. It is crucial for both informal and formal support systems to be sensitive to gender- and chronologically-based differences and offer tailored services to couples at the time that they experience infertility problems.

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