Chapter 4
PSC, Effort-Reward Imbalance and Cognitive Decline; A Road Safety Experiment

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Abstract To date little research has investigated the effects of work stress on cognitive performance or the spillover from work to domains such as driving performance. In this experiment 79 employees, randomly selected from the community, completed a change detection task that related to driver safety. Work stress factors investigated were self-reported effort-reward imbalance (ERI) and Psychosocial Safety Climate (PSC). While work stress factors were not directly related to cognitive ability on the task, both ERI and PSC moderated the expected positive relationship between age and cognitive decline. As ERI increased the positive relationship between age and time to detect change became stronger. This result was corroborated with PSC; as PSC levels decreased the strength of the positive age to cognitive decline relationship also became stronger. Results imply that low levels of management concern for worker psychological health and failure to reciprocate high work effort with high rewards may exacerbate cognitive decline with age, with implications for workplace performance and spillover to other domains such as driving safety.

4.1 Work Stress

Estimates suggest that every year work stress costs the Australian economy over 14 billion dollars (Medibank Private, 2008). Importantly the consequences are not just economical; work stress also spills over into a number of other domains. With extensive research linking work stress to work-family conflict (Bolger, DeLongis, Kessler, & Wethington, 1989), increased cognitive failures (Van Der Linden, Keijsers, Eling, & Van Schaijk, 2005) and numerous adverse health outcomes (Van Vegchel, De Jonge, Bosma, & Schaufeli, 2005). While there is no single unifying model of work stress, there are a few models that dominate recent literature, including the Job Demands-Resources model (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) and the Effort-Reward Imbalance (ERI) model (Siegrist, 1996). The ERI model focuses on reciprocity of exchange at work,

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with high effort combined with low reward work conditions perceived as especially stressful. The ERI model centers around a number of assumptions (Siegrist et al., 2004). First, high effort and low reward conditions at work increase susceptibility to adverse health due to unrelenting autonomic strain reactions. Then, a pattern of sustained ERI further increases the risk of adverse outcomes (Feldt et al., 2013). The ERI model has been shown to predict numerous adverse outcomes including cardiovascular disease (Bosma, Peter, Siegrist, & Marmot, 1998; Peter & Siegrist, 2000; Siegrist, 2010), sleep disturbances (Fahlén et al., 2006; Kudielka, Von Känel, Gander, & Fischer, 2004; Ota et al., 2005, 2009), burnout (Bakker, Killmer, Siegrist, & Schaufeli, 2000), alcohol dependence (Head, Stansfeld, & Siegrist, 2004), musculoskeletal pain (Joksimovic, Starke, vd Knesebeck, & Siegrist, 2002) and depression (Jolivet et al., 2010; Kikuchi et al., 2010). Given that the model was initially developed in the context of work stress and cardiovascular health, it is unsurprising that research of the ERI model is dominated by investigations into physical outcomes.

Psychosocial safety climate (PSC) is an organisational climate construct that is defined as "policies, practices, and procedures for the protection of worker psychological health and safety" (Dollard & Bakker, 2010, p. 580). PSC is theorised as a leading indicator of work stress, and a predictor of work conditions such as ERI.

Importantly in recent years there has been an increase in studies that investigate outcomes of work stress in different qualitative domains (e.g., emotional, cognitive) and in domains outside of work (i.e. spillover). As an extension of this work, the current study is concerned with ERI and PSC outcomes that do not immediately appear to relate to health, but rather have an indirect effect on health through their potential implications for safety both on the road and at work. Given that many employees are also road users, with an estimated 71% of Australian adults using a passenger vehicle for the daily commute to work or full time study (Australian Bureau of Statistics [ABS], 2014), there is potential for work stress to spillover into road safety. This study proposes that the mechanism by which this may occur is through a cognitive effect called 'change blindness'. This study broadens the scope of work stress research by investigating non-physical domains, which are noticeably scarce in a body of research dominated by physical health outcomes (Van Vegchel et al., 2005). Failures of visual attention have serious implications for safety and an understanding of these outcomes and the influencing factors may aid research into preventative strategies. Specifically this study aims to use a combination of self-report and experimental data to: (a) investigate the associations between work stress (ERI and PSC) and road safety related change detection); (b) examine if psychosocial work factors (ERI and PSC) moderate the association between age and road safety related change detection.

4.2 Change Detection

A potential outcome of work stress, with adverse implications for road safety, is cognitive failure. While few studies have investigated the effect of ERI on cognitive functioning it is well established that as age increases many cognitive functions decline (Levy, 1994). This natural degradation process, thought to start in early adulthood (Salthouse, 2009), includes the ability to detect perceptual change. Several previous studies have noted that older adults are slower at detecting changes in driving scenes than younger adults (Caird, Edwards, Creaser, & Horrey, 2005; McCarley et al., 2004; Pringle, Irwin, Kramer, & Atchley, 2001). We propose,

Hypothesis 1 There is a positive association between participant age and the time taken to detect change, such that as age increases so too does the time taken to detect change.

Again research into the association between work stress and cognitive failures is limited; however, one study identified that burned out workers self-reported a higher number of cognitive failures and displayed more deficits in objective attention compared to workers who were not burned out (Van Der Linden et al., 2005). Similarly research has found that visual scanning ability, amongst other cognitive functions, is substantially degraded when the participant is stressed and severely sleep deprived (Lieberman, Tharion, Shukitt-Hale, Speckman, & Tulley, 2002). With regard to road safety, visual attention is paramount. Failures of visual attention are thought to be responsible for "*sorry mate, I didn't see you*" crashes (White, 2006) and approximately 10% of all driver errors (Brown, 2002). Prominent failures of visual attention include inattentional blindness and the closely related concept of change blindness. Change blindness, coined by Rayner (1975), refers to the failure to notice a substantial change that occurs during a brief visual disruption (Jensen, Yao, Street, & Simons, 2011). In practice, this could be a driver failing to notice that a traffic signal has changed to red after checking their rear vision mirror.

While some cognitive failures have previously been researched in the context of work stress, change blindness has remained uninvestigated. This leads to

Hypothesis 2 There is a positive association between ERI and the time taken to detect change, such that as ERI increases so too does the time taken to detect change, and

Hypothesis 3 There is a negative association between PSC and the time taken to detect change, such that as PSC increases the time taken to detect change decreases.

It is important to consider that natural cognitive decline may be conditioned by workplace experiences. Over and above the main effects of ERI and PSC on change detection, it could be expected that for employees in workplaces with higher levels of stress (i.e. high ERI, low PSC) that the expected positive relationship between age and cognitive inefficiency could be modified by work stress. For ERI, continuous exposure to demands in the absence of commensurate rewards in the form of money, esteem or career opportunities, is likely to produce negative emotions, along with psychobiological stress responses, and adverse health effects in the longer term (Siegrist et al., 2004). These health and well-being reactions could exacerbate or strengthen the positive association between age and cognitive decline. Conversely at lower levels of ERI, employees can manage demands and the relationship between age and cognitive decline could be softened.

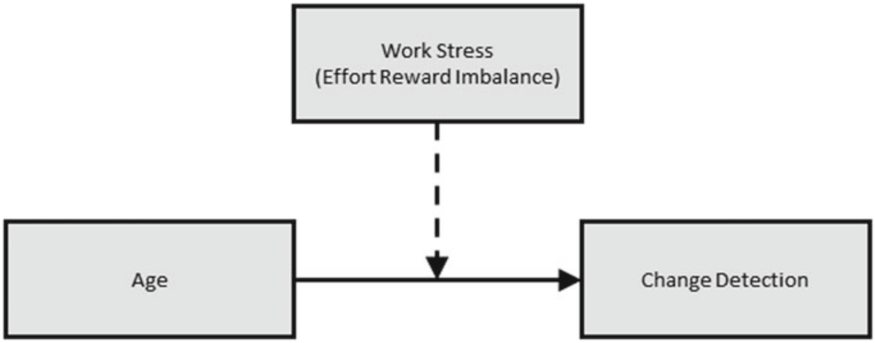

Fig. 4.1 Moderation effect of ERI on the association between age and change detection

Hypothesis 4 ERI will moderate the association between age and change detection, such that the influence of age on change detection will be intensified by the presence of a higher level of ERI (see Fig. 4.1).

PSC concerns how workplaces prioritise worker psychological health on balance with productivity concerns. PSC reduces psychological distress in workers in several ways. First in high PSC organisations, managers ensure that work demands are not excessive. Second, in high PSC contexts managers ensure that resources are adequate to get the job done. Job level resources such as job control and social support that could assist workers to reduce stress effects. For example, job control could enable one to manage demands through worker decisions about when, where, and how to undertake tasks so that on a daily basis so their effect on health and well-being is reduced. Evidence shows that PSC moderates (reduces) the relationship between, job demands and psychological health (Dollard & Bakker, 2010), negative customer behavior and employee psychological wellbeing (Zimmermann, Haun, Dormann, & Dollard, 2009), job demands and depression (Hall et al., 2013), and, bullying/harassment and psychological health problems (Law et al., 2011). Third, high PSC contexts could also generate a safety signal to workers that it is safe to utilise resources to reduce the impact of demands on distress. Evidence of this as a three way interaction effect (PSC x resources x demands) is found in Dollard, Tuckey, and Dormann (2012).

In the current study we expect that the PSC of the employee's organisation, because of its role in reducing work stress, may play either an aggravating or alleviating role in the association between age and change detection, depending on its level. Aging employees may experience less cognitive decline if their employer is committed to the provision of adequate resources and a psychologically safe context within which to use them. Conversely if their employer disregards employee psychological wellbeing and the conditions that affect levels of distress, stress will increase and cognitive decline may worsen. We propose,

Hypothesis 5 PSC will moderate the association between age and change detection, such that the influence of age on change detection will be amplified by the presence of a lower level of PSC (see Fig. 4.2).

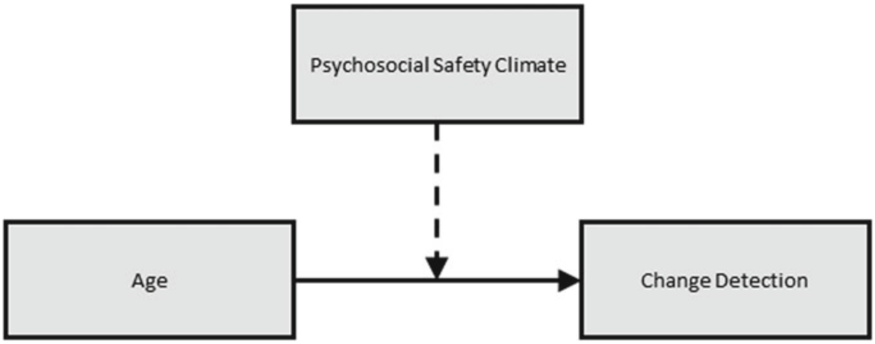

Fig. 4.2 Moderation effect of PSC on the association between age and change detection

4.3 Method

4.3.1 Participants

Over a period of 6 weeks 98 participants were recruited via door knocking in 10 randomly selected suburbs across metropolitan Adelaide. The 10 suburbs represented the complete range of socio-economic levels in the Greater Adelaide Region, according to the ABS 2011 index of socio-economic advantage and disadvantage (Australian Bureau of Statistics [ABS], 2013). Streets within each suburb were randomly selected and residents were approached between 10 am and 5 pm on weekends and 5.30 pm and 7.30 pm on weeknights. Participation was restricted to adults, engaged in an average of 25 h paid employment per week, with a current drivers licence and normal or corrected to normal vision. Self-employed persons were excluded on the grounds that the chosen measure of PSC is likely not appropriate for self-employed workers (Hall, Dollard, & Coward, 2010). While 123 people consented to participate, 25 were excluded due to incomplete data (see Fig. 4.3). The sample was restricted to participants with at least 2 years of experience (to ensure adequate exposure to work conditions) in their current job and with complete age data, leaving a sample of 79 participants. Refer to Table 4.1 for participant descriptive statistics.

4.4 Measures

4.4.1 Demographic Information

Demographic information was collected pertaining to participant age, sex, socioeconomic level, occupation, average weekly hours worked, length of service in their current job, and average hours of sleep per night. Socioeconomic levels were deter-

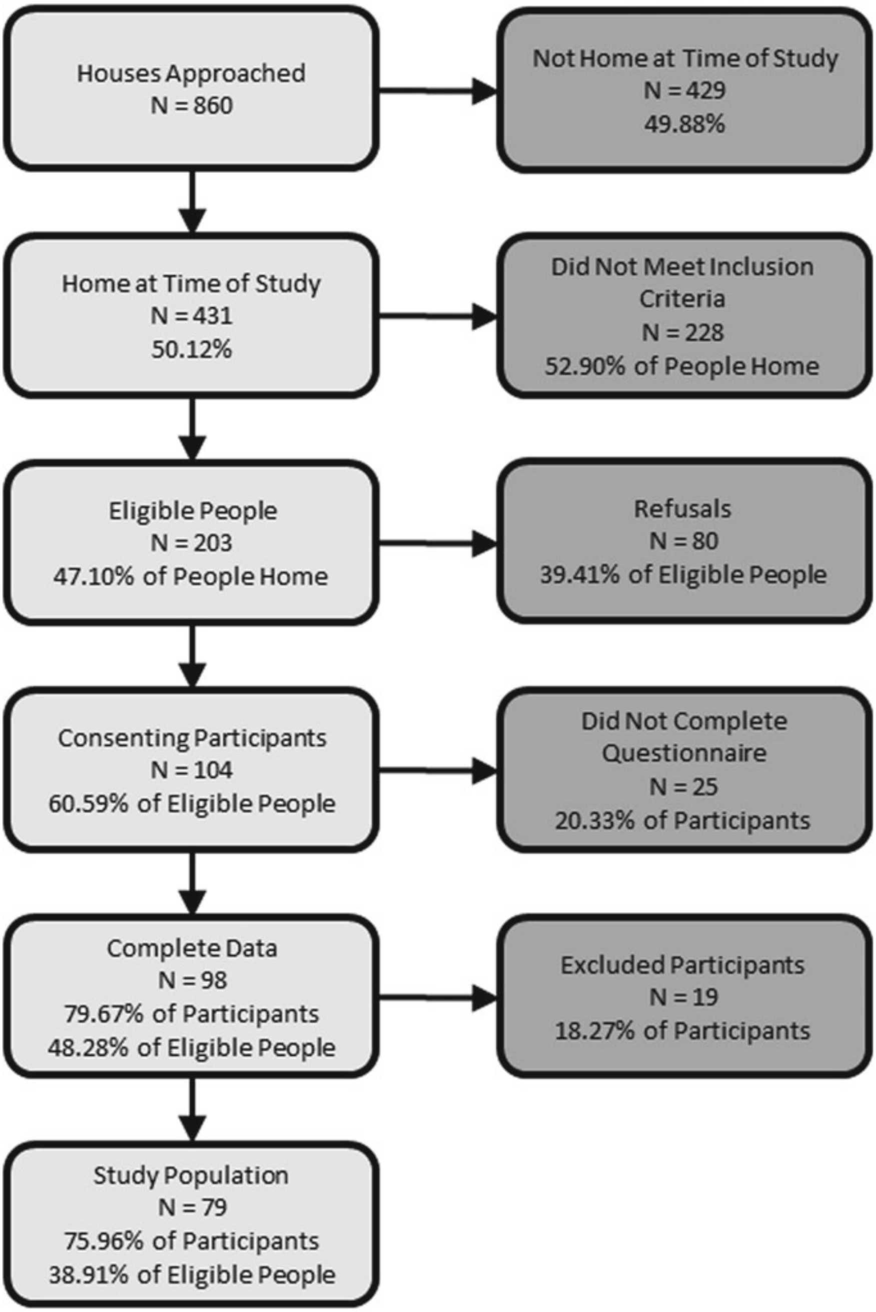

Fig. 4.3 Summary of participant response rates

Table 4.1 Study 2 means (M), standard deviations (SD), ranges and reliability coefficients for scales

Variable	N	M	SD	Range
Age	79	44.91	12.82	20–66
Hours per week	79	38.56	9.01	8–60
Years in job	79	9.85	9.26	2–40
Hours sleep	79	7.12	0.93	5–9
Years with licence	79	26.58	13.41	3–50
ERI	79	0.99	0.30	0.57–2.5
PSC	79	38.71	10.31	13–60
Change detection (IES)	79	3112.41	1087.05	1567–5701

Sex	N	Percentage
Male	45	56.96
Female	33	41.77
Unspecified	1	1.27

mined by cross-referencing participant postcodes with the ABS 2011 index of socio-economic advantage and disadvantage (ABS, 2013).

4.4.2 *Effort Reward Imbalance*

ERI was measured using the effort and reward subscales from the updated version of the ERI Scale (Siegrist, 1996). The original version required participants to respond using a complex two-step process; however the updated version used in this study was previously simplified such that items are scored on a 4-point Likert scale where responses range from 1 (*strongly disagree*) to 4 (*strongly agree*) (Siegrist et al., 2004). The effort subscale ($\alpha = 0.74$) is comprised of six items (*e.g., my job is physically demanding*), with a score range of 6–24; the higher the score the more effort exerted at work. Two items from the original rewards subscale were combined in the updated version to form the new item "I receive the respect I deserve from my superior or a respective relevant person", reducing the number of items to 10 ($\alpha = 0.84$). The rewards subscale has a score range of 10–40, with lower scores indicating fewer rewards. The effort-reward ratio is computed by dividing the effort score by the reward score after multiplying the reward score by a correction factor of 0.6 (to adjust for number of items in each scale). An effort-reward ratio close to 0 denotes a favourable condition, whereas values over 1 indicates risk of strain.

4.4.3 Psychosocial Safety Climate

The PSC of the participant's workplace was measured using the PSC-12. The instrument, developed by Hall et al. (2010), comprises 12 items such as "Senior management show support for stress prevention through involvement and commitment" scored on a 5-point Likert scale, where responses range from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores ranged from 12 to 60, higher overall scores indicate a healthy psychosocial safety climate ($\alpha = 0.96$).

4.4.4 Change Detection

Individuals' ability to detect change was measured objectively using a change blindness test designed specifically for this study. Administered electronically the test employed a flicker paradigm (Rensink, O'Regan, & Clark, 1997) to measure the time it took for a participant to detect a change. The 15 trial test was preceded by a block of 4 practice, however 3 trials were removed from the test due to poor participant accuracy rates while a fourth was removed due to the poor effect it had on internal consistency. The included images were selected from 40 scenes previously used in an investigation of change blindness in driving scenes (Galpin, Underwood, & Crundall, 2009). In each trial a natural driving scene and a modified version of the same scene were alternately flashed on the computer monitor for 500 ms each, interposed by a white masking screen displayed for 100 ms. One aspect of the scene changed back and forth with each screen flicker, see Fig. 4.4 for the sequence of a typical trial. Once participants detected the change they pressed the spacebar to stop the flicker and open a forced choice selection screen. Alternatively the trial was terminated if a response was not recorded within 60 s. Participants then used the keyboard to identify which section of the image the change had occurred in. A response was classified as an error if the participant made an incorrect selection or if no response was recorded. Stimuli were presented electronically using Open Sesame software (Mathôt, Schreij, & Theeuwes, 2012), on a 13.3 in. Sony Vaio Pro laptop within participants' own homes. Participants were instructed to respond as quickly and accurately as possible. Viewing distance was not monitored and participants were free to select a distance that best suited them. The average time taken to detect change, weighted for accuracy using inverse efficiency scoring (Townsend & Ashby, 1983), was seen to denote an individual's ability to detect change, with a low inverse efficiency score (IES) indicating that the participant was able to detect change quickly. Reliability for the trials was adequate ($\alpha = 0.72$).

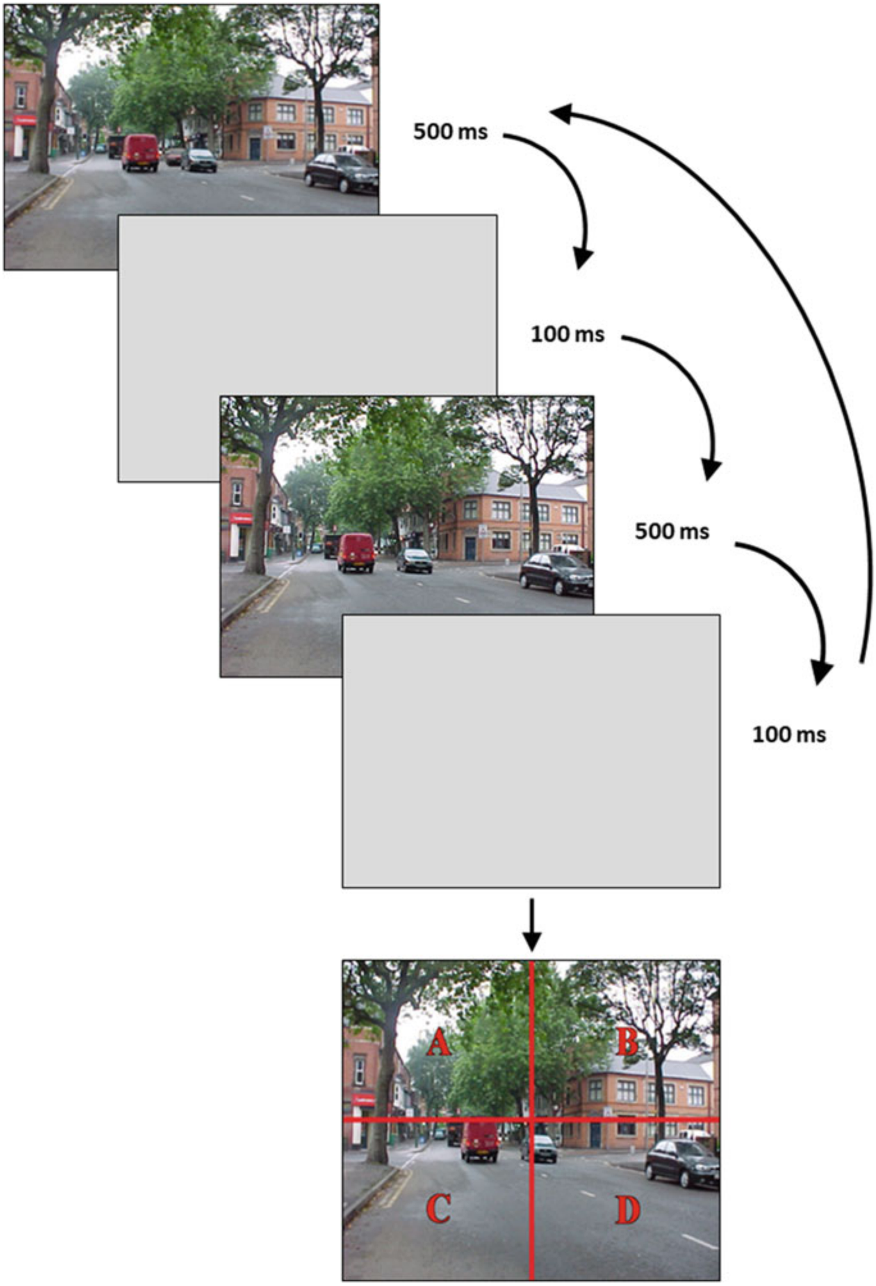

Fig. 4.4 Sequence of stimuli in change detection test

4.4.5 Design

The study employed a cross-sectional, correlational design that used both self-report data and objective data obtained through reaction time testing.

4.4.6 Procedure

Residents within the recruitment zone were notified of the study through an initial information letter which was distributed in the mail one week prior to the commencement of door knocking. Residents were then approached between 10 am and 5 pm on weekends or 5.30 pm and 7.30 pm on weeknights, screened for suitability at this time and provided with a detailed information sheet. The change detection test was administered to consenting participants within their homes under the direction of the researcher. Participants were then provided a link to the accompanying questionnaire, hosted online by FluidSurveys.com. Those who wished to complete the questionnaire in hardcopy were provided with a reply-paid envelope. Change detection results were matched to questionnaires through an ID number provided by the researcher.

4.5 Statistical Approach

Data were entered into SPSS v20 and screened for adherence to assumptions. In a number of instances technical malfunctions and pre-emptive responses resulted in missing values for the change detection test. In order to minimise attrition the missing values were replaced with the mean of correct responses for that participant. Conversely missing values for the ERI and PSC scales were replaced with the mean for the relevant item. In instances where participants provided a range for their demographic data the mean of that range was used. The internal consistency of all measures was checked and found to be reasonable (> 0.70). ERI ratios were logarithmically transformed to correct for a positive skew as recommended by Siegrist et al. (2004) while change detection reaction times were weighted for accuracy using inverse efficiency scoring as suggested by Townsend and Ashby (1983). For ease of interpretation the ERI ratios presented in Tables 4.1 and 4.2 are untransformed. Direct associations were investigated through three separate linear regressions, while interaction effects were investigated through separate ordinary least squares regressions calculated via the PROCESS macro for SPSS (Hayes, 2012).

Table 4.2 Predictors of time taken to detect change and ERI interaction

	B[a]	SE B	*t*	*p*
Constant	3149.34 [2939.36, 3359.32]	105.41	29.88	$p < 0.001$
ERI (centred)	657.82 [−136.15, 1415.78]	398.56	1.65	$p = 0.103$
Age (centred)	47.98 [30.49, 65.47]	8.78	5.46	$p < 0.001$
ERI x age	73.69 [4.87, 142.51]	34.55	2.13	$p = 0.036$

Note $R^2 = 0.35$
[a]95% confidence intervals displayed in parentheses

4.6 Results

4.6.1 Participant Demographics

The response rate was 38.91% of eligible people approached while the attrition rate was 20.33%; complete response rates can be seen in Fig. 4.2. Descriptive statistics for the sample are displayed in Table 4.1.

4.7 Change Detection Ability

4.7.1 Direct Effects

Hypothesis 1 proposed that there is a significant positive association between age and time taken to detect change, such that as age increased so too did the time taken to detect change. This was confirmed with B = 45.15, 95% CI [28.86, 61.45], $t = 5.52$, $p < 0.001$, with age accounting for 28.3% of the variance in time taken to detect change ($R^2 = 0.28$).

Hypothesis 2 proposed that ERI would be positively related to time taken to detect change. No significant association was found between ERI and change detection, B= 298.23, 95% CI [− 605.29, 1201.75], $t = 0.657$, $p = 0.513$, with ERI accounting for less than 1% of the variance ($R^2 = 0.006$). Likewise for Hypothesis 3, that PSC would be negatively related to time taken to detect change, was not supported (see Table 4.3).

Table 4.3 Predictors of time taken to detect change and PSC interaction

	B[a]	SE B	t	p
Constant	3102.46 [2895.14, 3309.77]	104.07	29.81	$p < 0.001$
PSC (centred)	10.53 [−9.42, 30.48]	10.01	1.05	$p = 0.296$
Age (centred)	45.9 [29.84, 61.96]	8.06	5.69	$p < 0.001$
PSC x age	−1.81 [−0.38, −0.25]	0.79	−2.30	$p = 0.024$

Note $R^2 = 0.33$
[a]95% confidence intervals displayed in parentheses

4.7.2 Interaction Effects

Hypothesis 4 proposed that the association between age and change detection is moderated by ERI (Fig. 4.5). This was supported by a significant interaction effect (Table 4.2). When ERI is low there is a significant association between age and change detection such that as age increases so too does time taken to detect change $B = 27.92$, 95% CI = [5.14, 50.69], $t = 2.44$, $p = 0.017$. When ERI is moderate there is a significant association between age and change detection such that as age increases so too does time taken to detect change $B = 47.98$, 95% CI = [30.49, 65.47], $t = 5.46$, $p < 0.001$. When ERI is high there is a significant association between age and change detection such that as age increases so too does time taken to detect change but the slope is much stronger than at low ERI, $B = 68.04$, 95% CI = [39.84, 96.24], $t = 4.81$, $p < 0.001$. The model accounts for 35% of the variance in change detection.

Hypothesis 5 proposed that the association between age and change detection is moderated by PSC (Fig. 4.6); this is supported by a significant interaction effect (Table 4.3). When PSC is low there is a significant association between age and change detection such that as age increases so too does time taken to detect change $B = 64.59$, 95% CI = [44.82, 84.25], $t = 6.51$, $p < 0.001$. When PSC is average there is a significant association between age and change detection such that as age increases so too does time taken to detect change $B = 45.9$, 95% CI = [29.84, 61.96], $t = 5.69$, $p < 0.001$. When PSC is high there is a significant association between age and change detection such that as age increases so too does time taken to detect change, but the effect is much smaller than at previous levels of PSC, $B = 27.22$, 95% CI = [1.78, 52.65], $t = 2.13$, $p = 0.036$. The model accounts for 33% of the variance in change detection.

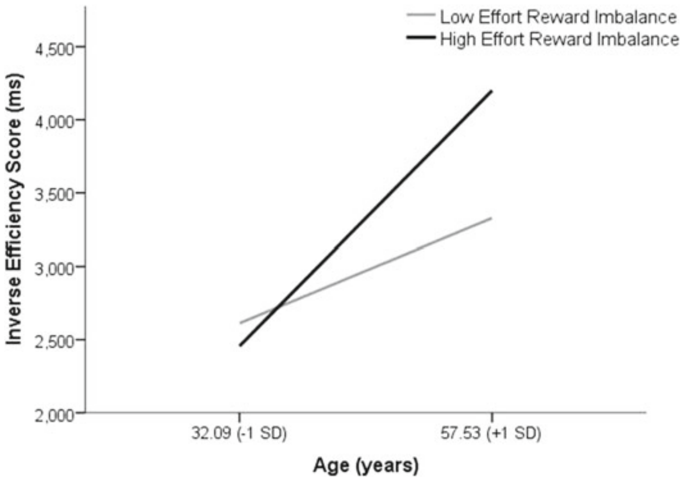

Fig. 4.5 Moderation effect of ERI on the association between age and change detection

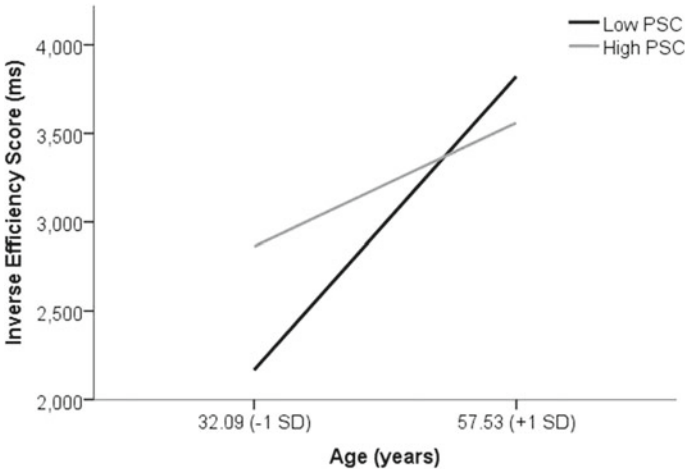

Fig. 4.6 Moderation effect of PSC on the association between age and change detection

4.8 Discussion

Investigations into ERI outcomes outside the realm of physical health are underrepresented in the literature. This is concerning when one considers that the consequences of many non-physical outcomes have the potential to be equally detrimental through their effect on safety and wellbeing. With this in mind the current study investigated ERI and change detection ability, which is linked to road safety because of its association with vehicular accidents (Deffenbacher, 2003; Deffenbacher, Deffenbacher, Lynch, & Richards, 2003; Deffenbacher, Lynch, Filetti, Dahlen, & Oetting, 2003; White, 2006). This study also explored change detection and to the best of our knowledge it is the first study to investigate the effects of work stress on change detection ability. While employees suffering high levels of work stress have previously been known to self-report an increased frequency of cognitive failures (Van Der Linden et al., 2005) it appears that in this instance work stress does not directly impact on individual ability to detect change. Results indicated that there was no significant association between ERI and change detection ability, with ERI explaining less than 1% of the variance in IES. Age however was significantly associated with change detection ability, such that as age increased so too did IES. Age explained 28.3% of the variance in IES. For every one year increase in age IES are predicted to increase by 45 ms. Based on this the predicted IES for a 20 year old is 1987.6 ms compared to a score of 3793.72 ms for a 60 year old. This is consistent with several previous studies (Caird et al., 2005; McCarley et al., 2004; Pringle et al., 2001) which have noted that older adults are slower at detecting changes in driving scenes than younger adults.

Natural cognitive decline in adults is a well-established product of aging (Levy, 1994) and this finding reaffirms that ability to detect change is one of the many cognitive functions involved. Results of separate moderation analyses show that psychosocial work factors significantly influenced the association between age and change detection, with both ERI and PSC exerting a similar effect. As expected the degradation effect is strongest in employees experiencing high levels of ERI and as the level of ERI decreases the association between age and time for change detection weakens. Likewise the degradation effect is strongest in people working in environments with a low level of PSC; as the level of PSC increases the association is tempered. The inclusion of ERI resulted in a model which explains 35% of the variance, while the inclusion of PSC resulted in a model which explains 33% of the variance. It is unsurprising that ERI and PSC exert a similar influence on the association between age and change detection, given that high PSC is expected to predict lower levels of ERI (Idris et al., 2012; Owen, Bailey, & Dollard, 2016). As PSC is a precursor to work conditions and in turn work stress (Dollard & McTernan, 2011), it is thought to be a good target for interventions aimed at preventing work stress and increasing wellbeing. The tempering effect of high PSC provides some support for this idea, demonstrating that the decline in change detection ability is less severe for employees who work in environments with good PSC. Finally, these results provide preliminary grounds for adding 'adverse conditioning effects on natural cognitive decline' to the extensive list of adverse consequences of either high ERI or low PSC.

The potential impact of these results on road safety is interesting. Degradation in the ability to detect change is concerning when one considers that failures of visual attention such as change blindness are thought to be responsible for "sorry mate I didn't see you" crashes (White, 2006), and approximately 10% of all driver errors (Brown, 2002). However, despite explaining 64% of the variance in driving test scores, the combined results of tests of movement perception, selective attention, useful field of view, and cognitive flexibility in previous research explains less than 20% of the variance in at fault vehicular accidents (De Raedt & Ponjaert-Kristoffersen, 2000). So while a decline in ability to detect change may lead to one being scored as a poorer driver there is little correlation between driving related abilities and at fault accidents. It is likely that this occurs because poorer drivers employ compensatory driving tactics (De Raedt & Ponjaert-Kristoffersen, 2000). While poor driving is undesirable it does not necessarily have the strong effect on vehicular accidents that one may expect. Likewise, age related cognitive decline does not necessarily have such a strong effect on the performance of everyday activities that one may expect (Salthouse, 1990).

Despite not necessarily translating into more vehicular accidents the effects of psychosocial work factors should still be a consideration. First, it is important to recognise that any potential impact on driving performance is relevant to the vast majority of Australians, with 71% of adults using a passenger vehicle for the daily commute to work or full time study (ABS, 2014). Second, if psychosocial work factors can influence one aspect of natural cognitive decline, then perhaps they may influence other functions that also degrade with age.

4.9 Limitations and Future Research

There are a number of limitations to this study that should be considered. First, causality cannot be inferred due to the use of a cross-sectional, correlational design. There is however, sufficient longitudinal evidence for adverse ERI outcomes (Van Vegchel et al., 2005) and evidence for the degradation of cognitive functioning with increasing age (Salthouse, 2009) to infer that the associations are in the direction presented. Moreover a single evaluation of ERI and PSC does not allow for consideration of the impact of different exposures to work stress. As such further longitudinal research is required to sufficiently explore the identified interactions. The sample size was also rather small, potentially leading to a failure to detect small effects. Future research should use a larger sample size to overcome this problem. Notwithstanding, we are confident that the recruitment method resulted in a good representative cross-section of metropolitan Adelaide. However we did not obtain demographics from non-respondents' so it cannot be determined whether respondents differed from non-respondents. Furthermore the present study did not measure or control for negative affectivity. This is a potential issue when one considers that negative affectivity may inflate associations between self-reported stress and adverse outcomes (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Last, the types of images selected for use in change detection tests influence how well the test relates to driving performance (Lees, Sparks, Lee, & Rizzo, 2007). As the images used in this study have not been mapped onto measures of driving performance it is unclear how well the test relates to driving performance, and while most changes were realistically depicted, several were not.

Future studies making use of change detection tests in relation to road safety may improve the validity of inferences by investigating the association between their change detection test and objective measures of driving performance, vehicular accidents and near misses. As this study narrowly focuses on work stress it overlooks the potential effects of other life stressors such as family or financial decline, and individual factors and health conditions (e.g. stroke, attention deficit disorder); future research may broaden the scope to also include these aspects. It may also be worth determining whether other aspects of cognitive functioning, impacted by natural cognitive decline, are also susceptible to the influence of psychosocial work factors.

4.10 Conclusion

As the first experiment to explore the effects of psychosocial work factors on ability to detect change, this study expands the ERI and PSC literature to include investigations of non-physical outcomes. In doing so we discovered that both ERI and PSC influence the change detection aspect of age-related cognitive decline. Consequently employers should take steps to ensure that they protect workers in their organisation by promoting good PSC and minimising ERI, which may help to prevent inflated cognitive decline in employees.

Key Messages

- Work stress is important to consider in relation to spillover effects outside the workplace, such as cognitive performance in driving safely.
- The expected positive relationship between age and cognitive performance (change detection time) was affected by ERI and PSC levels; the strongest cognitive decline was found under the worst work conditions (i.e., high ERI and low PSC).
- ERI and PSC results suggest that these stress work factors are worthy of consideration during “sorry mate I didn’t see you” traffic accident investigations.

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